COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Weekly Newspaper

Second-class postage paid at Boston, Mass., and additional mailing offices

Price: $9/year

December 19, 1973

Vol. VII, No. 51

NEWSPAPER

CW Photo by M. Zientara

Privacy Board Born

Massachusetts Gov. Francis W. Sargent congratulates the chairman of the new Commission on Privacy and Data Banks, Arthur Miller of Harvard Law School, after swearing-in ceremony last week. Behind them is Serena Modigliani of Belmont, Mass., another member of the commission. Story on Page 7.

Service Bureaus Rally to Stop Planned Cut in Business Hours

By Marvin Smalheiser
CW West Coast Bureau

LOS ANGELES — Representatives of some 80 service bureaus here attended an energy crisis rally recently and unanimously supported an effort intended to avert a city proposal for cutting business hours to 50 hours a week.

The representatives helped launch the drive with contributions of $6,000 to $7,000 for expenses, including attorneys' fees.

David Coriaty, part owner of Applied Data Services, Glendale, Calif., said representatives of the Association of Data Center Owners and Managers (Adcom) and its attorney would meet with city officials to offer alternative solutions to save energy.

Coriaty said service bureaus are being asked to have all customers review the reports they receive to see if all are essential.

"It might cut revenue a little but it could make a contribution," he said.

Rather than any blanket cutback in power, each industry should be given the opportunity to present its own conservation plan, Coriaty said.

"Our plan is to make better use of computer time," he said.

"Where there is a three-shift operation and some idle time during operations, a 10% to 20% saving can be made in machine time by compressing work and then closing the building when work is completed," he noted.

Coriaty, who is president of Adcom, had previously testified before the city council against the plan to cut business hours to 50 hours a week across the board.

The city's proposal was part of

Related story on Page 6

a program that included rolling blackouts and other stringent power reductions which the Department of Water and power officials claim are needed immediately.

Coriaty said Adcom has prepared an impact study to show the city council how curtailment of hours "would force us out of business and create mass confusion throughout the city."

Coriaty said he felt the 50-hour week would wipe out computer users because an in-house computer has to run at least 15 hours a day to be economical.

Adcom, he said, will try to make its point with ads, newspaper and television interviews and appearances at city hearings.

Here DP Qualifies As Pro Bono Publico

By Lee Felsenstein
Special to Computerworld

SAN FRANCISCO – All professions have the responsibility of preventing their services from being just a commodity sold to the highest bidder. The older professions of medicine and law meet this responsibility by encouraging their members to give a part of their services without concern for fees, using the extent of the need for the services as the main criterion. This is referred to as their *pro bono publico* (for the public good) service.

But can data processing similarly qualify as a profession by equally serving the public good?

It is a substantial question, but one which Resource One, Inc. is answering affirmatively.

Resource One is a non-profit-making, charitable corporation which grew out of the desire of some computer science students to create new ways to use computer technology which would be useful to, and used by, ordinary people on a grass-roots level.

This year Resource One is offering a Community Memory Service in Berkeley, Calif.

The following dialogue gives an example of the nature of the service:

"What's this?"

"Your friendly neighborhood

(Continued on Page 4)

On the Inside

Keypunch Incentive Plan Brings Employer Bonuses

By E.J. Balawyder
Special to Computerworld

WINNIPEG, Man. The perennial problem of motivation and staff stability has existed since the inception of data entry. It has become increasingly difficult to instill in the employee the need for speed and accuracy without some form of aid to encourage it. Recognition of the individual's ability through praise and remuneration, although effective for a short period, eventually loses its effectiveness.

The highly competitive world of salaries in industry today plays an important role in attracting employees, thus creating an imbalance as demand continues to exceed the supply.

What can be done to motivate and stabilize?

Gambles Canada here felt an incentive plan was needed. As a result, a program was developed to encourage employees to increase speed and reduce errors while at the same time increase

User Casebook

their earning power through a bonus program.

The results were highly significant: increased throughput, more effort by the individuals, reduced overtime, reduced absenteeism and, most important, a sense of accomplishment on the part of the employee.

What do the employees have now which they lacked? Incentive – the incentive to feel that

(Continued on Page 4)

A User Looks at the DP Industry

By Bruce Gilchrist
Special to Computerworld

During the past few months several organizations have put forward their views on how the computer industry should be organized.

The Computer Industry Association (CIA) has proposed that IBM be broken up into seven "Newcos," each of which would be able to offer as full a line as it wishes of hardware and software.

In contrast to this vertical restructuring proposal, the Adapso/Software Industry Association (SIA) has proposed a horizontal restructuring which would require IBM to separate off all its software development and production into a separate corporation which could give no preferential treatment to, or gain advanced knowledge of, IBM-manufactured hardware.

Both the CIA and SIA naturally expect their own members to benefit from their respective proposals and both, as might be expected, claim the user would also benefit.

As a user I am not so sure I want either the CIA or SIA to represent my views

VIEWPOINT

because their basic objectives may not be identical to mine. Although the two associations recognize that reasonably contented customers are necessary to their success, their prime motive has to be the profits of their members.

A user, on the other hand, while recognizing it is generally beneficial to have healthy and competitive suppliers, is primarily interested in getting his problems solved in some optimum way.

In any industry restructuring, the user must be concerned with subjects such as vendor reliability, maintainability of multivendor systems, availability of systems improvements when needed, ability to upgrade current systems without necessarily having to completely reconfigure or reprogram, etc.

Some of these problems may be satisfactorily resolved by simply having a very competitive industry, others may need industry-wide standards or even agreements that it is inappropriate or illegal for a single company to compete in all or

(Continued on Page 4)

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY
TM Reg. U.S. Pat. Off.

DR. H.R.J. GROSCH, *editorial director*

EDWARD J. BRIDE, *editor*

RONALD A. FRANK, *senior technical editor.* E. DRAKE LUNDELL JR., *computer industry editor.* MARVIN ARONSON, *editorial production chief.* V.J. FARMER, *systems editor.* DONALD LEAVITT, *software editor.* MARY UPTON, *financial editor* and *assistant computer industry editor.* LESLIE FLANAGAN, JUDITH KRAMER, *copy editors.* PATRICK G. WARD, TONI WISEMAN, MARGUERITE Y. ZIENTARA, *staff writers.*

E. DRAKE LUNDELL JR., *Washington bureau.* MARVIN SMALHEISER, *West Coast bureau.* J.H. BONNETT, *European bureau.* HIDETSUNA SASAKI, *Asian bureau.*

CONTRIBUTORS: J. DANIEL COUGER, *education column;* ALAN TAYLOR, *Taylor Report* and *professional practices.*

NEAL WILDER, *vice president – marketing.* DOROTHY TRAVIS, *sales administrator.* JUDY MILFORD, *advertising coordinator.* KATHRYN V. DINNEEN, *market research.*

LEETE DOTY, *production manager.* HENRY FLING, *production supervisor.*

W. WALTER BOYD, *publication manager.* PATRICK J. McGOVERN, *publisher.*

EDITORIAL OFFICES: 797 Washington St., Newton, Mass. 02160. Phone: (617) 965-5800. Telex: 92-2529. Washington: Room 1129, National Press Bldg., Washington, D.C. 20004. Phone: (202) 638-0901. Telex: 89-544. Los Angeles: 963 N. Edgecliffe Drive, Los Angeles, Calif. 90026. Phone: (213) 665-6008. Europe: Computerworld, c/o IDC Europa, Ltd., 140-146 Camden Street, London NW19 PF, England. Phone: (01) 458-2248/9. Asia: Computerworld, c/o Dempa/Computerworld Company, Dempa Building, 1-11-15, Higashi Gotanda 1-chome, Shinagawa-ku, Tokyo 141. Phone: (03) 445-6101. Telex: 26792.

Second-class postage paid at Boston, Mass., and additional mailing offices. Published weekly (except: a single combined issue for the last week in December and the first week in January) by Computerworld, Inc., 797 Washington St., Newton, Mass. 02160.

25 cents a copy; $9 a year in the U.S.; $10 a year in Canada; all other foreign, $25 a year. MARGARET PHELAN, *circulation manager.* Four weeks' notice required for change of address. Address all subscription correspondence to circulation manager, Computerworld, 797 Washington St., Newton, Mass. 02160

Computerworld can be purchased on 35mm microfilm in half-volumes (six-month periods) through University Microfilm, Periodical Entry Dept., 300 Zeeb Rd., Ann Arbor, Mich. 48106. Phone: (313) 761-4700. ab

COMPUTERWORLD, INC.

Patrick J. McGovern ..... *president*
W. Walter Boyd ..... *executive vice president*
Robert M. Patterson ..... *vice president–int'l.*
T. Neal Wilder ..... *vice president–marketing*

BPA ABP AIA

POSTMASTER: Send Form 3579 (Change of Address) to Computerworld Circulation Dept., 797 Washington St., Newton, Mass. 02160.

It's Accounting for Many Things

Farming No Longer Sowing, Reaping

MANHATTAN, Kan. – Farming is no longer a simple matter of sowing and reaping, according to researchers at Kansas State University. Today's farmer has to juggle inventories, loans and accounts payables, but a computer is now making those tasks a little easier.

K-MAR 105, developed by Kansas State, is an accounting system which provides farmers with information on a monthly basis for use in the management of farm operations, said Larry N. Langmeier, Kansas State economist who helped develop K-MAR.

"The computer doesn't tell them what to plant," he said, "it just provides them with the information they need to make their decisions."

The farmers provide the data input hy filling out check and deposit tickets and ledgers which are used for miscellaneous data acquisition.

All farmers record their income and expenses; beginning and ending inventory of grains, supplies, livestock, accounts receivable, cash in bank and savings, and all crop production. This is all done on specially precoded forms, according to Langmeier.

Based on this information, each farmer receives a 15-page monthly report, which gives him a complete listing of his input transactions, a cash flow analysis subdividing all his income expenses by category, a credit analysis of all loans and accounts receivable and a net worth analysis of his business.

The monthly report also includes a payroll analysis, income statement and an analysis of each enterprise on which he is keeping records.

In addition to monthly reports, each farmer receives a complete listing of income and expenses, a tax management report and depreciation schedules. At the end of the year, a complete year-end analysis of his farm business is provided, according to Langmeier.

All K-MAR farmers are members of the Farm Management Association which provides fieldmen to help farmers interpret the output and apply it to their businesses, Langmeier said. There are currently 175 farms on K-MAR, most of which are "average commercial farms," he said.

Each farmer mails his input tickets to one of six Farm Management Association headquarters. They are then forwarded for preprocessing. The punch cards are then sent to Manhattan where they are processed daily on the university's 360/50.

The system was started in late 1968 as a research project, which it still is, Langmeier said. "It's primary objective is to perfect an optimum electronic system for farmers. We're currently building a complete data bank from information from year-end analyses to put out applied studies," he added, "to provide beyond accounting system type of information."

Exercise Role in Coronaries Probed

By Marion Rubinstein
Special to Computerworld

DALLAS – "The computer now has become an integral part of determining the role exercise might play in preventing or delaying coronary heart disease."

Speaking was Dr. Gerry Purdy, director of computer technology at the Institute of Aerobics Research here. Established by Dr. Kenneth H. Cooper, former Air Force doctor, the institute specializes in preventive and rehabilitative medicine.

The center is composed of three separate organizations:

- The Cooper Clinic, which performs health examinations.
- The Institute of Aerobics Research, which analyzes the data from the clinic and performs research in aerobics.
- The Aerobics Activity Center, which provides exercise facilities under a medically prescribed and supervised program.

"Dr. Cooper recognized the value of the computer back in 1966, but because of the large financial investment we were not able to get a computer of our own," Purdy said. The institute uses a Texas Instruments terminal with a phone connected to a Xerox Sigma 7 at the Wadley Institute, where leukemia and cancer research is conducted, Purdy said.

Special keypunch sheets, Purdy added, were used to enter the results of "our very detailed four-hour examination of each of the 3,000 patients who have come to us from all over the world since November 1972, when we put in the Data Management System, originated by Xerox Corp. and IBM.

"It has enabled us to write programs that help our patients become well and stay well. It also enables us to define, create and retrieve important information so that we can complete not only the Dallas study but other studies that will help future generations of patients threatened by heart disease and also tell others how to avoid such disease," Purdy added. Working with Purdy to complete the computer detailing are a programmer and two keypunch operators.

"The Dallas study," as all the data is now known, will attempt to relate specific amounts of exercise to reduced incidence of particular ailments. "Mostly heart disease and arterial diseases," Purdy said. He added that within five to 10 years there should be enough statistics to document whether programmed exercise can help reduce these diseases and also many pulmonary ailments, ulcers and even various mental disorders.

To achieve this fitness, the facilities of the Aerobics Activity Center include a quarter-mile jogging trail with night lighting, a half-mile jogging trail, a 25-yard heated six-lane swimming pool, an air-conditioned Tartan-banked indoor track, bicycle ergometers, treadmills and weight-lifting equipment.

This non-profit project was aided by an initial $60,000 grant from the Moody Foundation in Galveston, Texas.

Purdy noted facts about the four-hour examination given to each of the 3,000 patients observed.

He has been able to:

- "Determine the initial level of fitness of the patient observed.
- "Observe the response to exercise.
- "Objectively determine the level of work that the patient may perform safely in his daily activities.
- "Prescribe an aerobics training program which will take an individual to at least a good level of physical fitness."

The "good level" of physical fitness is defined as the ability of the body to absorb 42 milliliters of oxygen each minute for every kilogram of body weight with adjustments for age, Purdy explained.

Future DPers Graduate

CW West Coast Bureau

LOS ANGELES – A special graduation ceremony was held recently by the Urban League Training Center (ULTC), one of the most successful non-governmental minority training programs in the nation.

The center has been a joint effort of the league, Bank of America and IBM and offers free training in programming, computer operations, keypunch operations and clerical skills.

Eighteen graduates were given diplomas by keynote speaker Councilman Billy G. Mills, who also presented the center with a resolution from the city council commending the Urhan League, Bank of America and IBM.

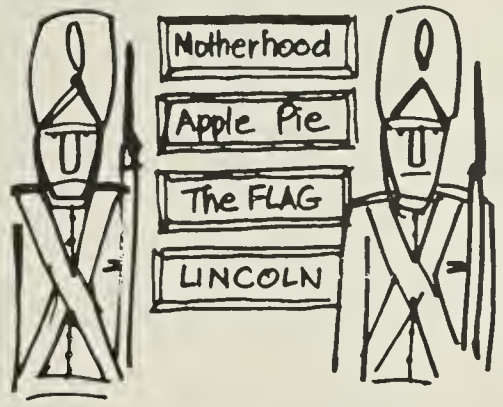
The bank provides the building and upkeep and IBM provides equipment and instructors.

Did You Know?

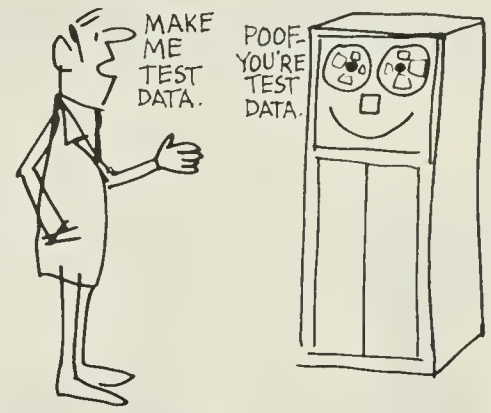
One of a series MAKING IBM INSTALLATIONS WORK BETTER

ADR's MetaCOBOL™ System could double your COBOL productivity.

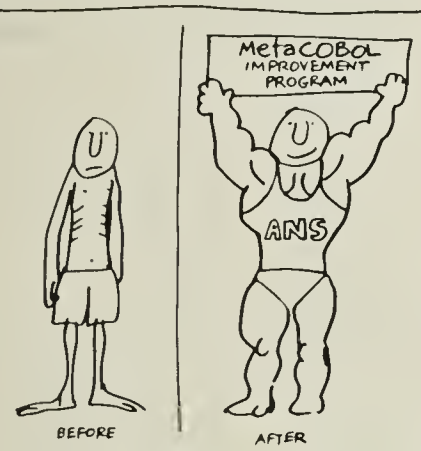
MetaCOBOL increases productivity in all phases of COBOL programming.



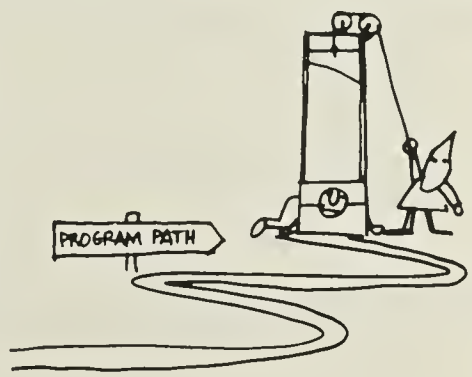
Allows installations to enforce their own COBOL standards.



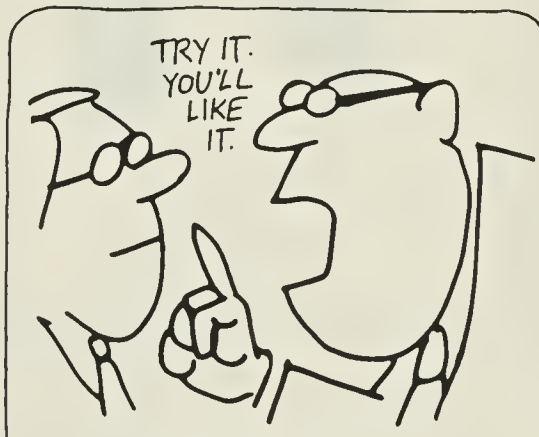
Simplifies and automates the generation of comprehensive test data.



Permits program upgrading during COBOL-to-COBOL conversion.



Documents COBOL program path execution.



Evaluates COBOL programs for operational efficiency & inefficient statements.

ADR's MetaCOBOL not only increases productivity. It helps you manage your installation significantly better. MetaCOBOL is an ADR breakthrough in COBOL development, testing, debugging, maintenance, evaluation, measurement, conversion and standards control.

Shouldn't your COBOL installation gain these benefits, too? They're proven in use at over 100 companies. MetaCOBOL is 100% compatible with COBOL.

For further information, just send us the attached coupon, or contact any ADR office.

APPLIED DATA RESEARCH THE SOFTWARE BUILDERS®

ADR software products: in use at over 2,500 installations worldwide.

APPLIED DATA RESEARCH, INC.
SOFTWARE PRODUCTS DIVISION
Route 206 Center, Princeton, New Jersey 08540
Telephone (609) 921-8550

Yes, I'm interested in MetaCOBOL.

Name

Company Title

Address

City State Zip

Telephone

Computer Configuration

I am also interested in:

- ☐ The LIBRARIAN . . . for security and protection
- ☐ AUTOFLOW . . . for maintenance and debugging
- ☐ SAM . . . for planning
- ☐ ROSCOE . . . for on line program development
- ☐ PI SORT . . . for faster sorting

U.S. offices in Atlanta, Boston, Chicago Cleveland, Detroit, Houston, Los Angeles, New York Pittsburgh, Princeton, St Louis, Washington, D C
Representatives in Australia, Austria, Belgium, Brazil, Canada, Denmark, England, Finland France, Germany, Italy, Japan, Netherlands, Norway, Puerto Rico, South Africa, Spain, Sweden, Switzerland Taiwan, West Germany

Incentive Plan Gives Employer Bonuses

(Continued from Page 1)
something extra can be gained through their efforts.

To make the program work and be effective, a comprehensive analysis of the operator's performance was made from the statistics available on the multi-keyboard data entry equipment.

Studies of the work habits of individuals were made to determine the effective production of individuals with varying degrees of experience. Trainees were employed and provided with on-the-job training to determine the effectiveness of such a program on the inexperienced.

Job Rotation

Job rotation was set up to ensure that employees were thoroughly qualified in all work in the department. Error factors were analyzed and a "department" average determined, to be used as a guide in the bonus program.

The results of the study were:

- All employees should participate in the program.
- Degrees of experience played a small part when effective production was measured. More important was whether the individual had the natural ability to be a good data entry operator.
- Job rotation ensured backup and promoted interest in the work of the department.
- An employee should qualify for bonus pay only after having maintained an acceptable keystroke average for a specified period (e.g. three months).
- Error factors should be employed in the program to help develop accuracy.

The program was then implemented on a test basis during April, May and June 1973, these being the high-volume months. The staff was made aware of the criteria under which the program was designed and suggestions were invited. A comparison of expenses in overtime, part-time and outside services was made for the same period of 1972. The statistics alongside show the results.

In addition, keystroke per hour rate increased 8% from April 1, 1973, to June 30, 1973, resulting in increased throughput.

The company officially endorsed the implementation of the program in September 1973 and Gambles Canada feels its objectives have been attained by the program.

Whereas some employees have left in order to pursue domestic duties, none has left to seek employment with other firms since the implementation of the program. All extra work which required night staff is now being done by the regular day staff. The remuneration paid to the employees on a monthly basis is a small investment for the stability and job satisfaction created by the program.

The bonus program has benefited employee as well as the employer. The positive attitude it created toward work within the department has enhanced employees' position within the company and has further assisted in retaining and attracting the high caliber of personnel required in data entry.

E.J. Balawyder is manager, data processing, at Gambles Canada Ltd., Winnipeg, Man.

Number of records processed: 1972 = 3,966,000
1973 = 3, 517,000

	Outside Services		Overtime		Part-Time	
	1972	1973	1972	1973	1972	1973
Total	$4,000	——	$2,691	$1,325	$5,480	$3,921
Net Savings	$4,000		$1,366		$1,559	

Excess expense 1972 - $11,171
Excess expense 1973 – $5,246 + $866 (bonus pay for April, May, June) = $6,112
Result: 48% reduction in additional costs

Absenteeism (Illness etc.)

	1972	1973
Total	1,612 hrs	638 hrs

Increased attendance = 61%

Results of the Incentive Program

Here DP Qualifies as Pro Bono Publico

(Continued from Page 1)
computer. It's like a bulletin board where people electronically post notices and search for other people's notices."

"Oh, wow! Is that a computer?"

"No, that's just a teletypewriter. It's hooked to our computer in San Francisco by that phone down there. Want to try it? Looking for something? It's free for now . . . "

"Are there any rides to Portland listed in it?"

"Why don't you try typing FIND RIDE PORTLAND . . ."

And so it goes.

The results have been pleasantly surprising. Even before they try it, people are delighted that at last a computer is available for benefits that are real to them. In over three months of operation, the "community" has expanded the current data base to over 700 items, and more than that number of items was deleted when they expired.

Operator Does Not Operate

The key operational design criterion is that the Resource One operator does not operate the terminal. Users do, while the operator simply assists them in entering and retrieving items themselves. Items are classified by keywords thought up by the users, with the help of a list of currently used keywords.

The basic hardware design criterion is that the hardware is not state-of-the-art, so its financial burden is kept very low. As might be expected considering the location, the hardware is a donated XDS 940 system, which was once part of a large time-sharing system when it was developed.

The software and hardware modifications are handled by the members of Resource One.

Regional, Town Needs Prepared

The group plans to provide multiple terminals on the Community Memory, moving toward an on-line network of neighborhood and regional information centers.

And it is working on a hardware and software package which will service a larger area, hopefully the information exchange needs of 100,000 people – with, naturally, minimal maintenance.

Resource One plans to remain non-profit. To have to support such efforts by turning a profit would jeopardize their positive social potential. There is also the fear of the political controls or excessive restrictions that experience leads us to expect from government funding.

Instead, Resource One intends to charge for commercial-type use of the network, with no charge for non-commercial use.

In this effort, perhaps, is a hope that the development and operation of these and other public-benefit applications by members of the DP profession will be a really important factor in the future value of DP to our society.

Many of the users have indicated they would be willing to pay a fee for Resource's services. But that is a matter for the future. For now, it is sufficient to say that Resource One has tried to provide *pro bono publico* services, and has found it not only possible but not too difficult to do at all.

Lee Felsenstein is president of Resource One, Inc. (Resouree One is interested in comments and correspondence regarding these issues. The address is 1380 Howard St., San Francisco, Calif. 94103.)

A User Looks at the DP Industry

(Continued from Page 1)
certain combinations of segments of the industry. Therefore, I believe it is very important that there be developed a *user* view of how the industry ought to be structured.

Unfortunately, this proposal to involve the user is a lot easier to make than to execute. Up to now the so-called user groups have shown little interest, primarily, I suspect, because of their close relationships with particular manufacturers.

Similarly, the professional societies have steered clear of studies which might affect the economic well-being of their members' employers.

For example, when Afips published a study by Milton Wessel and myself of the government's role in the computer industry calling for a "commission on the computer industry," the president of one of the Afips constituent societies called the subject "controversial" and pointed out that Afips involvement in such issues would raise constitutional questions for his society.

Who then will put forward the user point of view? Certainly some individual users will make their views known. But views or opinions alone are not enough; they must be backed up by well-researched data. Only an organized effort with the necessary financial backing can produce position papers similar to those which the vendor side of the industry is putting out.

To do this we need an organization of users which would be independent of any vendor and be dedicated solely to the promotion of the interests of users.

Now it would be naive to believe that if only the users would develop a position on the industry's structure everyone else involved would immediately embrace it.

Our American adversary theory of justice calls for both sides or positions to be stated in the best way possible by each side from their own points of view. If one side doesn't bother to present its case well, it tends to lose out. Thus, if they wish to be considered, the users must present their view of how the industry should be structured.

How does a representative user organization get started? This is indeed the $64 question. My personal view is that the start should come from a few major users who use equipment from both IBM and other vendors.

If these users would provide the financial backing for the organizational period and for perhaps the first small study, I suspect other users would rapidly join. After all, there are about 50,000 of us – perhaps not all looking for a leader or even wanting to get involved, but all with considerable stakes riding on the question of how the industry will be structured in the future.

Bruce Gilchrist is director of computing activities at Columbia University. Previously he served as president of the American Federation of Information Processing Societies (Afips) for two years and as the federation's executive director for five years.

COMPUTERISTICS INC.
SUBSIDIARY OF UNIROYAL, INC

COMPUTERISTICS INC.
SUBSIDIARY OF UNIROYAL, INC

Just 1 Left

This Year (1973)

370/158

All New - I.T.C. Available For Sale or Lease

2 Available Jan. 74

2 Available Feb. 74

2 Available March 74

1 Available April 74

1 Available May 74

Other 370's Including 168's Also Available

For More Information Please Contact

BJ Mahoney, Dr. Tebo or JL Delaney

Continental Information Systems Corporation

Midtown Plaza Syracuse, New York

(315) 474 5776 Telex 93-7435

COMPUTERISTICS INC.
SUBSIDIARY OF UNIROYAL, INC

COMPUTERISTICS INC.
SUBSIDIARY OF UNIROYAL, INC

N.E. Service Bureaus Tell How Best to Allocate O-I-L

By Molly Upton
Of the CW Staff

Service bureaus in New England are helping mitigate the effects of the oil shortage by supplying heating oil distrihutors with updated information on the best means of allocating oil.

Computerized records are kept on about 70% of New England's oil customers, either through service bureaus or systems run by the fuel distributors, according to Lee Yaffa of the New England Fuel Institute in Boston.

New England is one of the more severely impacted areas in the current energy crisis, as the Northeast depends more heavily than the rest of the country on imported number 2 oil. New England receives about 25% to 30% of its supply from abroad, whereas the Nixon Administration is estimating a shortfall of only 17% in oil supplies for the nation overall.

Who Needs Oil?

A program developed by Allied Data Services Corp., Danvers, Mass., gives its dealer clients weekly updates on which consumers are going to need deliveries, and suggested amounts.

Taking into account the amount of oil already at the customer location, the consumption rate of each customer, the total customer consumption and the supply available to the dealer, Allied determines how much oil the dealer is short.

The individual customer's consumption rates and the date of resupply to the dealer are added to determine which customers are in need of deliveries sooner than others.

"We can't give the dealer any more fuel oil, but we can make it go further, or optimize deliveries, so that whatever supply the dealer has isn't wasted in storage in his customer's tank," said Stanley Ferbank, president of Allied Data.

The program is run weekly, as dealers receive reports of when fuel will be available to them, and in what varying amounts. Some oil companies have all the oil they need while others are cutting back supplies by as much as 27%, he said.

Allied Data uses a Honeywell 200 with 48K, four tape drives and two disk drives. The program, called Datafuel, is written in Cobol and is being licensed to other service bureaus. It can run in 20K with two or three tape drives, Ferbank said.

Another service bureau is leaving the decision of deliveries up to the distributor, but is providing them with an ideal delivery schedule, based on consumption rates from last year, and a note indicating which customers may be held for later deliveries and suggesting an appropriate partial delivery.

The option is up to the distributor, as he is the one who may have to force customers to reduce consumption, noted Harvey Deitel, analyst at Business Computer Services, Needham, Mass.

In addition, his firm is providing clients with a weekly exception report spotlighting customers who are not conserving fuel.

A monthly report will indicate the cumulative progress of each account, how much less oil each customer has used, and how much less was delivered.

Business Computer Services runs some of its programs on two IBM 7074s, which are "real work horses," and also uses two 360/30s, a 1401 and a shared 360/40.

Survey Service Utilizes CRTs

RADNOR, Pa. – Take a computer and 26 CRTs, combine them with a telephone network, and you may have the greatest marketing research breakthrough in years.

This is what Chilton Research Services thinks and it should know because it's using the system for a computer-based survey service, taking advantage of the speed and accuracy of computers to guide the interviewer.

A "survey processor" package, based on IBM's Coursewriter, does all the work. It prints out the questions on the CRT screen and the interviewer just reads the question and keys in the appropriate answer. Coursewriter even personalizes the survey, so that if the interviewee uses Brand X, the CRT questions automatically contain the name Brand X.

In addition to preparing the questions, recording answers and analyzing results, the computer also generates a statistical cross-section of phone numbers to call.

This service permits wider-ranging surveys. Chilton is currently conducting 50,000 CRT-generated interviews a month for one survey alone.

What Do the Kush Say?

PARIS – The most up-to-date technology is being used to decipher an ancient and dead language, the oldest written language of inland Africa.

The Meroitic script of Southern Egypt was the language of the people of Kush, who flourished from the 8th Century B.C. to the 4th Century A.D. and developed the first major civilization far from the continent's coasts.

Only a few symbols, grammatical forms and some proper names in the language are understood.

Prof. Jean Leclant of the Sorbonne University, writing in a report for the U.N. Educational, Scientific and Cultural Organization (Unesco), said that the French enthusiasts have collected 900 texts and stored them in a computer.

Mass. Activates Privacy Board

By Marguerite Zientara
Of the CW Staff

BOSTON – Gov. Francis W. Sargent has appointed a special Commission on Privacy and Personal Data to deal actively with the problems of computer technology and personal privacy. Sworn in last week to the 15-member board were representatives from the fields of medicine, computer technology, social work, business, education and the law.

The independent commission has been set up as "a vehicle to examine privacy problems in a comprehensive manner and to deal primarily with the privacy and confidentiality implications of computerized recordkeeping and information gathering systems as they affect Massachusetts citizens."

In swearing-in the commission, Sargent said, "Ironically, the villain is also our ally. We cannot do without modern technology . . . but unchecked, it presents unparalleled dangers. The unregulated use of computer technology threatens to change the very meaning of the individual in our society."

Arthur Miller, professor of law at Harvard Law School, will act as chairman of the group, and Dr. David Lewis, chief physician at the Washingtonian Center for Drug Addiction, will serve as vice-chairman. Representatives of the computer community on the commission include Dr. Robert Fano, associate head, department of electrical engineering for computer science and engineering, MIT; Dr. Herbert R.J. Grosch, editorial director, *Computerworld*; Richard M. Morrison, member of the Educational Computer Task Force; and Dr. Jerome B. Wiesner, president of MIT.

The commission will work closely with existing administrative structures dealing with the problem of privacy including the Security and Privacy Council of the Criminal History Systems Board, the Committee on Human Rights and the Information System Policy Committee.

The official gubernatorial charge to the commission includes:

- Examining all state government data systems which contain information concerning private individuals and the means used for insuring the confidentiality thereof.
- Reviewing existing relevant state statutes, regulations and administrative practices as they pertain to personal data and recommending to the governor any legislation or other action which may be necessary to insure confidentiality of data, including the development of adequate standards on content, personal access and access by agencies other than those which collected the data.

Mass. Agencies Balk at New Bid to Expand Data Bank

By Marguerite Zientara
Of the CW Staff

BOSTON – The reluctance to computerize data banks is once more evident in some state agencies' reactions to a proposed expansion of the Massachusetts criminal history data bank.

Involved is a request submitted to the Law Enforcement Assistance Association (LEAA) in October by the Law Enforcement Committee (LEC) for $573,800 "to implement the data communication network of remote terminals and communications lines" for the Criminal Justice Information System (CJIS). The system will maintain records from the Probation Department, the Department of Health and Safety, the Department of Correction and the Parole Board, according to Richard Galtman, counsel to LEC chairman Arnold Rosenfeld.

It is not clear at this time whether the system will be hooked up to the National Crime Information Center (NCIC), Galtman said. "The only thing clear at this point is that a system is being developed that can possibly interface with NCIC at some point in the future. The decision to have an interstate system has not been made," he said.

New Review Process

The negative reactions of some state agencies were made known in accordance with a new proposal review process, through which various state agencies are asked to comment on a proposal before it is submitted to the Justice Department. Among critics were the Commission Against Discrimination, the Department of Mental Health and the Department of Community Affairs.

Drug Rehabilitation Commissioner Matthew Dumont of the Department of Mental Health pointed out what he considered to be technological infringements on individual rights: "The system interfaces are clearly defined in terms of their smooth and efficient operation, but there is not any discussion of what data will be allowed to cross which interfaces."

Galtman said the system will have its own set of safeguard regulations, which are now in the process of being drafted and are expected to be promulgated in February. It will probably be two years before the total system is up and running, after having been fully tested and accepted, Galtman said.

"My understanding is that a decision on the grant is fairly imminent by LEAA. To the best of my knowledge there will be no difficulty in getting it," he said.

Survey to Probe Parish Attitudes

SAGINAW, Mich. – The Saginaw Roman Catholic Diocese has started implementation of a computerized attitude survey to determine the needs of the diocese and its parishes.

The diocese is taking a "canned" program run by the Liguori Redemptorist Fathers. But rather than taking the prepared questions, the diocese is asking its 120 parishes to submit the questions they'd like answered by the parishioners.

The questionnaire will be broken down into categories such as liturgy, administration, education and social activities. Each parish will receive a questionnaire of 60 questions, 48 of which will be the same for all and 12 of which will be tailored to the individual parish.

After processing by the Liguori computer, answers, spread over the bases of sex, age and marital status, will be returned to the respective parishes for implementation of the results.

Remnants Reduced

PORTSLADE, Sussex, England – "Waste not, want not." We've been saying it for years and now a computer system is helping James Todd and Sons follow the doctrine.

A turnkey system implemented by BCL and based on a Molecular 18 computer is handling accounting for 2,000 Todd customers and stock control for some 500 cloths of different materials and colors.

Oldest First

When an invoice is raised by direct entry of the order via a keyboard, the system allocates the stock in the most economical way, avoiding leaving remnants as much as possible and using the oldest stocks first.

Expected delivery dates can be quoted on the invoice for items which are out of stock; a computer printout allocates cutting and setting up times for warehouse workload; and a video terminal is used in answering telephone inquiries from customers regarding stock availability, customer account balances and delivery dates for out-of-stock items.

NRMA Rates OCR the 'Most'

NEW YORK – The National Retail Merchants Association (NRMA) has officially endorsed Optical Character Recognition (OCR) as the most desirable technology for use in merchandise and customer identification.

The recently released NRMA Systems Specifications Working Committee report stated the committee recognizes the need for further evaluation.

Efforts to develop a satisfactory functional optical font technology and an acceptable OCR font similar to existing standard fonts will require industry cooperation, according to the report.

"NRMA has coordinated the project and enlisted the assistance of manufacturers and suppliers, as well as the Department of Commerce, National Bureau of Standards, in order to obtain a compatible technology for use in the future," said Irving Solomon, vice-president of NRMA's Information Systems Division.

The Old Wurlitzer Plays Different Tune

By Robert L. Glass
Special to Computerworld

SEATTLE – What do you get if you cross a computer with an organ? Would you believe a player organ?

That's the dream of Lee Bauscher of Seattle, an electrical engineer with a deep love for organs.

For eight years he has been adding both literal and figurative bells and whistles to a 1924 Wurlitzer Opus 1609 theater pipe organ, and the culmination of that effort is expected in about three months when he ties in a computer-driven player system.

Bauscher's encoding programs have worked so well that he is now in the process of picking a minicomputer to tie into his organ. With the mini aboard, Bauscher figures he's added a triple threat to his system:

- Theater organ masters, members of a nearly extinct group, can come and play his organ, and be recorded on tape for future playback.
- Coded sheet music can be fed into the computer from a teletypewriter and produce organ music output in real-time.
- The computer can be unleashed, and computer-generated music can also be played in real-time.

Bauscher is tackling the project for both fun and profit. He has applied for several patents on his system, and is dickering with at least three organ makers who want to use it.

Since the day in 1965 when the long-unused organ was delivered to Seattle from a dealer in Omaha, and unloaded as stacks of parts in Bauscher's basement (it took six men five hours to get it off the truck and tucked into safe and dry places), it has undergone constant modification.

First, the puzzle had to be put back together. That took Bauscher until 1967.

Then, not content to sit on an already impressive home project, he began work on his "color organ." A "color organ" is one that not only plays music, but also is accompanied by an electronically coordinated light show.

As step three in his Wurlitzer rehabilitation project, Bauscher built some multiplexed and digitized electronic black boxes which cut the number of wires, 1,600, to two!

Bauscher also wrote programs for the IBM 360 and various minicomputers to play with two interrelated concepts – encoding music as input to a program whose output would be a Wurlitzer and black box-compatible magnetic tape; and computer generation of music by random selection techniques.

Is Insurance Coverage Good For Your Site?

TORONTO, Ont. – A simple way to determine the security of your computer system is to check it against the following list of security "musts" concerning insurance protection:

- Before obtaining insurance coverage, compile an inventory of the potential hazards facing your installation, the likelihood of the occurrence of each of these hazards, and the potential dollar losses resulting from the occurrence of each type of hazard. Also, consider your responsibilities in leasing agreements.
- Next, perform an analysis of costs versus benefits to determine the magnitude of the potential loss, the cost of preventive action and the net savings, if any.
- Obtain adequate insurance coverage. Insurance coverage available for computer installations includes:
  - Broad, all-risk insurance against physical damage to part or all of your equipment.
  - Broad, all-risk coverage against damage to your files and records (media), including computer programs, data and documents when they are being transported to and from another installation.
  - Broad, all-risk extra expense coverage for those additional costs incurred when running the operation at a backup site after a disaster.

This checklist was compiled by DCF Systems Ltd., 74 Victoria St., Toronto, Ont. M5C 2A5.

Editorial

Reasons for Optimism

Computer users are beginning to organize to protect their interests.

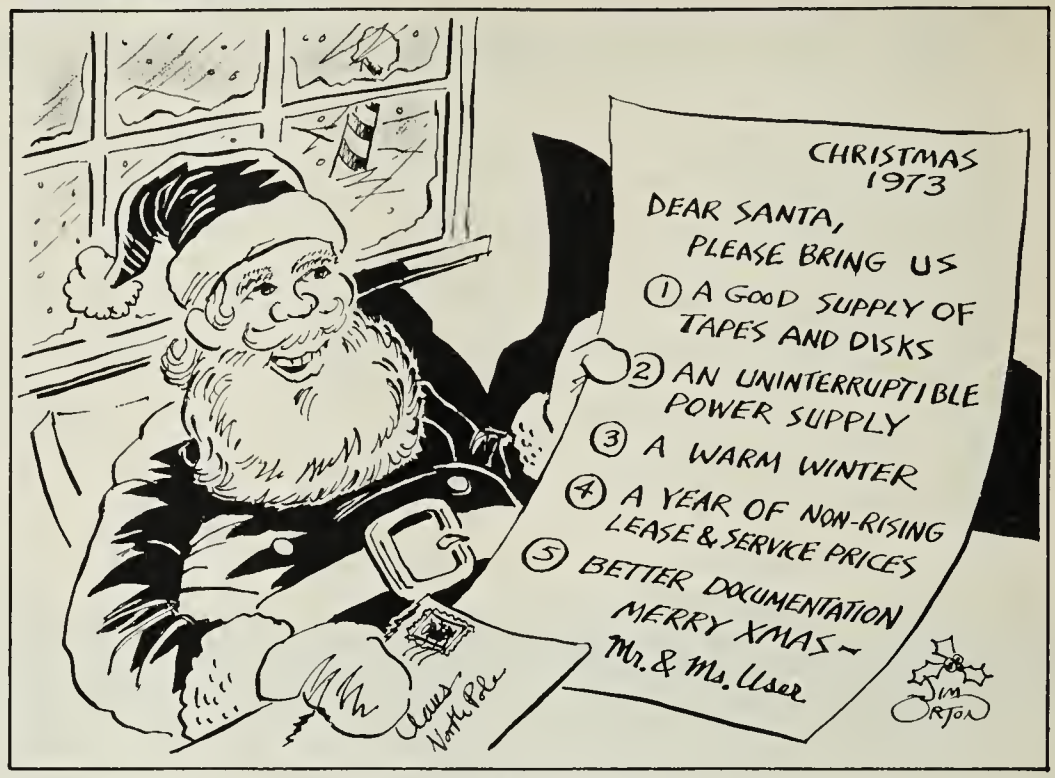
The California meeting of service bureaus (see Page 1) may finally trigger some action in other parts of the country, hopefully in the Northeast, where the power situation is expected to be especially bad this winter.

While opposing a reduced work week, the service bureaus also proposed specific alternatives, including adjusting work flow so as to maximize computer usage.

Another user's opinion is noted in Bruce Gilchrist's Page 1 viewpoint article, which calls on the user community to present a unified front to determine how the DP industry should be organized.

While a little short on specifics, the suggestion is a refreshing break from industry haggling among those with vested interests. (On the other hand, it is the user community *per se* which has the greatest vested interest in this case.)

Both these events give us cause for optimism, and what time of year could be better than now?



'It's a Big Order, But I'll Try...'

Letters to the Editor

The Forgotten Users: 370/155, 165 Owners

I believe the purchased 370/155 and 165 users have been forgotten by IBM, the government and the press.

Over 1,000 of these machines were purchased when IBM knew very well they would be obsoleted in less than two years; 1,000 machines at $1.75 million each is a $1.75 billion problem.

A three-year shorter life than expected will cost us, $1.75 billion divided by 48 times 3 years, $110 million in rent. It would cost us another $105 million for VS "DAT boxes."

Fred Held
Hawthorne, Calif.

The reader has a good point, although we have by no means ignored this question. A recent survey revealed little dissatisfaction among 155 and 165 owners. If some of these users do speak out, it might lead to some cost-effective support either from IBM or independent hardware suppliers. We would like to hear from some of these "forgotten" users. EB

Banks Cannot Afford Sloppy Systems Design

Computerworld's answer to Jerrold Asher's letter about Alan Taylor's Blue Cross columns [CW, Dec. 5] does not address the most basic issue. What if the Blue Cross system had not finally sorted out the situation? It might well have ended in a suit against the bank and an investigation by the banking authorities.

The trust we put in our banks is fundamental to our whole financial system. The banks have an extraordinary responsibility, greater than mere customers like Taylor and Blue Cross. They cannot be allowed the luxury of sloppy system design.

The bank *must* be able to prove what it did with a check. This is the only way we can have rational resolution to disputes such as Taylor's. The cancelled check with its endorsements is the fundamental proof of payment. If the bank failed in its duty (I find it hard to accept that it did) by design (choosing to endorse lock box checks with a general stamp that does not show the payee), it does not deserve to be allowed to continue doing business.

This appears to be the fundamental failure in the situation described. With a proper cancelled check Taylor would not have to suffer at the hands of Blue Cross. This does not excuse the unbelievably bad system and public relations at Blue Cross, of course, but the public has learned to expect such incompetency from large government and quasi-government organizations. The public does not expect or accept it from financial institutions and I hope it never has to.

Name and address withheld by request

Software Patent a Blessing

The Page 1 headline, "Software Patent Threatens Many Users," in the November 28 issue seems misleading. The article's approach could easily have been more positive and fair with such headlines as "New Software Patent May Help Many Users" or "New Software Development May Improve Computerized Accounting Systems."

The important point is that the announcement of a new software patent should be considered a blessing rather than a curse. A legitimate patent should represent a unique, "revolutionary" process and reflect a significant advance in the state-of-the-art.

In this case, therefore, the Homa patent should be regarded favorably rather than presumed a threat. If Xoma Ltd. should sue "infringers" for royalties, the courts will then determine the actual novelty and validity of the claimed new technology.

Unfortunately, rather than promoting a favorable climate for patented software, *Computerworld* seems to have frightened a potential benefactor for new software technology and created negative feelings for our patent system, which as provided for in the U.S. Constitution serves "to promote the progress of science and the useful arts."

We all know that current costs of developing computer applications are high, while quality and reliability are still somewhat low. So let's have an open mind and let's even encourage something new on the horizon.

Martin A. Goetz
Vice-President
Applied Data Research, Inc.
Princeton, N.J.

The issuance of a program patent has little direct bearing on a computer user; it has long been the stance of ADR and other software firms that patents encourage innovation in the software community, and we do not necessarily disagree with this, as a long-term effect.

However, the tone of Don Leavitt's article was taken from Homa's communication to us that his company had "served notice" on the computer community that he intended to collect royalties.

We of course agree that if royalties are due, they should be collected. The "threat" comes in the form of the legal fact that a person or firm can be forced to pay royalties even if his infringement was unintentional.

A user could develop, on his own, an invention (including a software program) that was so similar to a patented invention that he would have to pay royalties, unless he could prove he had been working on his invention before the filing of the successful patent application. EB

MIB Data Does What?

Re "Your Body May Be in MIB Today," Page 1, Nov. 7:

MIB information cannot be used to rate, reject or postpone insurance applicants.

It can only be used as a starter to obtain additional information from current sources.

Howard F. Brenner
Vice-President and
Secretary
Home Mutual Life Insurance Co.
Baltimore, Md.

Lengthy discussions and correspondence with Brenner and others familiar with the MIB system lead us to believe the article was not misleading.

The article pointed out that MIB data is used to alert life insurance companies to potentially bad risks. Brenner feels MIB data is not used to "postpone" insurance, but we feel that, as "a starter" for more detailed background investigations, such a service is tantamount to postponement.

We are not saying this is wrong, just that it is so. EB

And the Sponsor Is...

In several stories on the Second National Conference on New Systems in Law Enforcement and Criminal Justice, the sponsor, New York University, and the coordinators, New York Management Center and Government Data Systems Magazine, were not identified.

We are delighted that your publication found the conference newsworthy.

Robert E. Gitelman
Conference Director
New York Management Center, Inc.
New York, N.Y.

Billing From Abroad

I have not yet found a firm using a computerized billing program that can cope with a foreign address requiring special postage rates.

Nothing is more exasperating than to receive by slow boat a bill requiring payment two weeks before receipt of the damn thing.

Stephen B. Waters
Senior Systems Programmer
Katholieke Universiteit
Nijmegen, The Netherlands

Our circulation manager replies, "A computerized billing program can be as sophisticated as the pocketbook dictates. The same holds true for customer services which are dictated by company policy and relate directly to dollars involved. *Computerworld*'s renewal notices and invoices are computer-generated, and for the computer the job ends there. These notices are forwarded to a lettershop to mail these notices per CW's instructions, which are:

- **"Enclose a postage paid Business Reply Envelope.**
- **"All foreign notices (incl. Canada) are to be sent first class airmail.**

"It is an error to equate customer services to a computer or its programs, which then becomes the scapegoat for poor fiscal or management policy."

How to Junk the Junk

I was interested to read the article in the Nov. 21 issue on "junk mail" by Ken Seidel.

I'm a relatively new subscriber to *Computerworld* and have found myself bombarded with unsolicited advertisements from businesses associated with the computer community.

Surely a newspaper that publishes articles against junk mail wouldn't have been responsible for that!

A.F. Haney
Spartanburg, S.C.

The subscriber does have the option to check a box if he does not wish to receive promotional mail; in Haney's case the box was not checked. When his address change is processed our circulation department will have his record flagged to indicate "no promotional mail."

Computerworld welcomes comments from its readers. Preference will be given to letters of 150 words or less. *Computerworld* reserves the right to edit letters for purposes of clarity and brevity. Letters should be addressed to: Editor, Computerworld, 797 Washington St., Newton, Mass. 02160.

Letters to the Editor

'Carnival of Greed'?

1,000 Conspirators Needed To Pull Off Conspiracy

Re the Nov. 28 editorial page column, "A Carnival of Greed":

I am always amazed at the peculiar predilection, shared by liberals and radical rightists alike, to dream up the most incredible conspiracies to interpret undesirable facts.

In a country where IBM can't lower prices without getting into trouble, do you really believe that all those groups got together to pull off this massive extortion of the American people? There would have to be at least 1,000 conspirators involved, and that alone would guarantee a leak of "plot."

You'd better check all your facts and think your position through again.

John J. Xenakis
Digital Equipment Corp.
Maynard, Mass.

Two Exaggerations

I always enjoy your standing on your head and wiggling your toes. Generally it is a very creditahle point you are trying to make or else you are having a good time and being obviously funny.

Therefore it disturbs me to read the Nov. 28 column which displays a lack of credibility. There are at least two ultra-extreme exaggerations, especially "The whole thing is clearly a greedy conspiracy . . ."

May I suggest that you obtain a copy of "Understanding the National Energy Dilemma" from the Center for Strategic and International Studies, Georgetown University, 1800 K St., N.W., Washington, D.C. 20006.

V.N. Vaughan Jr.
American Telephone & Telegraph
New York, N.Y.

Both of you gentlemen are quite right. In the heat of indignation I said "conspiracy." Not so. If it is publicly announced that the cops are on strike, burglaries and muggings will rise spontaneously. No conspiracy is required. HG

'Obvious Observations'

Those congressmen (Dellums and Stark of California, among others) who have cautioned us on the outside chance that a takeover of our government and dissolution of Constitutional rights are at hand, are perhaps not as paranoid as they are foresighted.

After all, if one wanted to take this step, especially if he is one who has been caught near the cooky jar with crumbs on his lap, what would be a more practical plan than to throw the country into disarray through oil, gas and energy shortages, rampant inflation of prices (not wages), and similar measures aimed at demobilizing and suppressing the masses! Next will come the curfew and restricted travel.

Let's not forget that this administration's early and generous supporters were and are the oil tycoons and the President hasn't failed them. Now in his distress they are using him deftly, while filling their pockets and setting back the environment another 100 years. He thinks he is using *them* to divert attention from Watergate and impeachment and conviction. The man is deluded, for while he pretends the President is above the law, he will soon find that Richard Nixon is not: for if the judge doesn't get him, the jungle will.

Thanks for the Nov. 28 column. Up to now, funny looks for saying similar things have been standard. I hope that you and other noteworthies will speak out often to assure people like me that our obvious observations aren't couched in naivete or paranoia.

Thomas E. O'Connor
Principal
Possibilities Unlimited
Cupertino, Calif.

'Let the System Work'

I have just finished several readings of "A Carnival of Greed," and while I appreciate the journalistic license for hyperbole. I think your viewpoint is somewhat limited by your ignorance, active or passive, of certain hasic economic concepts.

While not an economist by profession, I have had sufficient formal training in economics to be qualified to reply on that basis. I also object to your casting of the problem in moral terms, but if required to argue on that basis instead, I am prepared to do so.

First of all, a "shortage" of a commodity such as gasoline means, in actuality, there is an insufficient quantity being offered to meet the quantity being demanded *at a given price.*

Such a situation represents a disequilibrium in the marketplace, a condition which can be remedied in a number of ways. Three quantities may be varied: quantity demanded, quantity offered and transaction price. The normal process of returning to equilibrium in a free market involves raising the price to the point where the quantity demanded at that price is reduced to where it equals the quantity offered at that price. This is how the "law of supply and demand" operates in the short term.

Over the longer term, the increase in price will attract additional suppliers of the same commodity and suppliers of alternative commodities into the market and the increase in supply will cause the price to drop (but not to the previous level).

Other more active means of forcing equilibrium may be applied, however. Since the problem may also be viewed as an excess of demand, steps may be taken to reduce or contain demand. Restricting speed limits or prohihiting Sunday driving are instances of attempts to reduce the demand for gasoline. These measures are typically legal in nature, rather than economic.

The final possibility is to seek to increase supply, also through other than economic means. For example, pipelines and offshore drilling may be authorized and environmental restrictions may be relaxed.

Now that the economics of the situation has been clarified, we are free to discuss morality. Personally, I believe the operation of the price system is an amoral mechanism for establishing long-term equilibrium.

Price is the mechanism by which we establish priorities in our society, and commodities go to those willing to pay the most for them: sort of an auction system overall. I do not believe that because a price increase deprives some individuals of (the ability to pay for) a scarce commodity that it is *a priori* immoral to raise prices.

If the denial of a commodity to certain individuals by reason of the price system

(Continued on Page 14)

Real Christmas Story of 1973 Concerns the DP Family

The Taylor Report
By
Alan Taylor, CDP

Data processors (the human kind, that is) come in all sizes and in many, many varieties. The tie that binds them often seems weak, nothing more than a common understanding of certain jargon, and some constructive laziness that suggests it is better to let machines do the work rather than ourselves.

The differences that divide them often seem insuperable. Word processors fight long battles with character-processors. Cobolists and assembly-nicks have been known to cut each other apart on the same public platform. Special-purpose systems developers seem to live in a world of their own, when it comes to talking about accounting control automation – and so on.

But all this squabbling is not necessarily bad. Indeed, much of it is vital. By bringing out the difficulties inherent in the various approaches the net result is either an elimination of fears, or else a discovery of dangers before a catastrophe. Squabbling certainly can achieve excellence, if one does not let it get too far, and if one does not forget DP really is the tie that binds.

In DP's history it has often seemed there were no signs of this recognition. It appeared our fighting had perhaps produced better systems, but had also produced short-sighted individuals concentrating upon the short-term needs, and not on the more general improvement.

The warmth of Christmas always seemed to be missing – and not surprisingly many Christmas greetings seemed to have a hollow ring, if they were offered at all.

This year seems different. This Christmas my feeling is that data processors are feeling closer together. We are seeing more and more that a good old family gathering can soothe old wounds, and initiate joint efforts. Software experts are coming to believe in hardware; generalists are seeing the advantages of specialist activity; and data processors generally seem to be thinking more than ever about the convenience of the users.

The IBM Management Review Committee minutes stress this abandonment of thinking on a box-by-box manner. The adoption of a more user-oriented structure has even permeated the Olympian heights of Armonk.

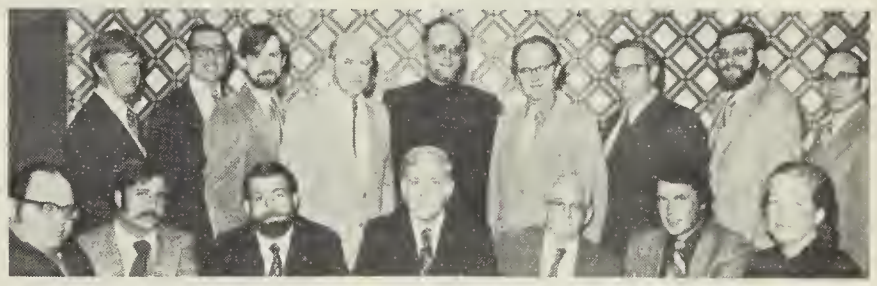
This attitude also seems to exist at a more modest level. Three instances seem to exemplify the new and welcome trend.

The most recent one lies in the basic concept behind the Packet Communications network, discussed here in the Dec. 12 issue. Currently, computers are often unthinking both in their usage of resources, and also in their insistence that they are the center of the universe.

Packet Communications is not based on such computer-centered thinking. Instead, it is using its own systems, and its leased telephone lines to serve other members of the DP "family." PCI wants to connect subscribers with terminals, and subscribers with computers. The idea is not to perform DP (indeed, that is specifically an almost forbidden function) but to use DP to improve the performance of others.

And that is a family concept – brand new in being FCC-approved in 1973.

So, also, is the equally new Community Memory facility in San Francisco (see Page 1). This facility is giving DP a good name because computers are shown as useful machines. Resource One, in my experience, has had a Christmas feeling about it all year round.



Society representatives gather at first director's meeting of ICCP. Top row: Cole Furr (Automation One Association); Jerry Martin (SCDP); Geffrey Thomas (Acpa); David Jacobsohn (IEEE Computer Society); Ron Stewart (SPDP); Alan Taylor (SPDP); Ken Lord (CDP); Jack Beyer (SDE); Roy Sedral (Ades). Seated: Marc Greenberg (SCDP); Willima Eich (ACPA); Fred Harris (ACM); John Swearingen (DPMA); Paul Pair (Aeds); Eric Ustad (DPMA); Janet Fox (ICCP).

The wonder of an ironsmith giving weeks of his time to put up the security gates around the computer, the programmers sitting down to design new ways for bringing an intrinsically old system into a new productive life; and the professional handling of the maintenance by volunteers have always seemd to me a modern fairy tale.

But now, in 1973, their efforts have paid off, and the strength of DP is helping others, not just data processors themselves.

That is another Christmas story.

The real hopeful Christmas story of 1973 is evident in the adjoining picture. The lion might well lie down with the lamb – with a bit of persuasion from an animal trainer. But to get ACM to lie down with DPMA . . .! In 1973 the DP community is seeing practically all the DP societies – fiercely competitive and proudly independent – sitting down at the same table in the Institute for Certification of Computer Professionals.

Here is real strength, more than any one or any group of societies can command.

Here is the strength in diversity that is the hallmark of a good family. And here, during Christmas 1973, we have that strength for the first time in the history of DP.

That this strength can he mobilized – for anything – is perhaps the best Christmas present the DP user can have.

So with that let us welcome all the family from ICCP in Chicago, to the West Coast's Resource One and the East Coast's Packet Communications, and the many, many others we don't know about yet.

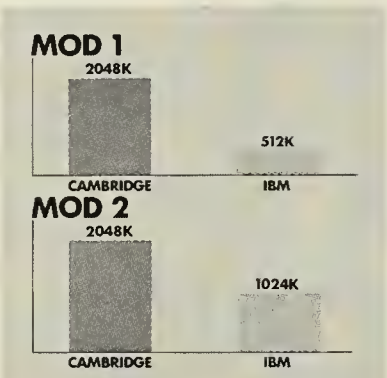
It's a wonderful family to belong to.

Merry Christmas, and a Happy New Year to you all.

370/ST

When we built our new add-on memory for IBM System/370 Model 145, we wanted to give you more reasons to buy ours than anyone else's.
Here are eight of them.

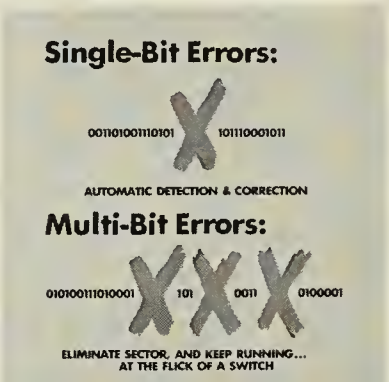
ONE.



DOUBLE (OR QUADRUPLE) YOUR IBM 370/145 MEMORY CAPACITY...

Regardless of the Model 145 you now have, you can expand it to two megabytes. For most 145 users, that means unlimited growth of systems, applications, files, packages and processing flexibility. Memory restriction is a thing of the past. Your investment in mainframe hardware is preserved for years to come.

TWO.



GET THE MOST COMPLETE MEMORY PROTECTION EVER OFFERED...

370/STOR 145 detects and corrects all single-bit errors, so efficiently they don't exist as far as you are concerned. And it provides immediate reconfiguration in the event of a multi-bit error. A flick of a switch isolates the error sector, and the rest of memory keeps running...and running...and running. It's like having no downtime problems to worry about.

THREE.

USE THE FASTEST, SAFEST MEMORY TECHNOLOGY AVAILABLE TODAY...

The 1024-bit bipolar chip. Both Cambridge and IBM use it for their 145 memories. It's extremely fast. It provides stable storage of data. It uses a single power level that eliminates many circuits, components, interconnect points and materials. The result: lower cost and great reliability for you.

FOUR.

AND GET THE MEMORY SIZE YOU WANT RIGHT NOW. NO WAITING.

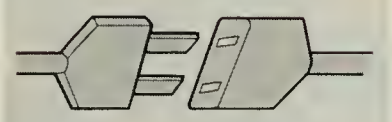
No one ever offered the choice of memory sizes available with 370/STOR 145. You can select exact IBM-size modules. Or 48K modules. Or 128K modules. Or 256K modules. And mix them any way you want. So you grow the way you want—in big steps or small. And you can start right now. We're already delivering.

CAMBRIDGE MEMORIES, INC., 696 Virginia Rd., Concord, MA 01742, (617) 259-9880

OR 145

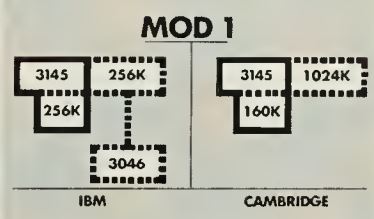
FIVE.

SIX.



TRANSPARENT PLUG-IN

SEVEN.



EIGHT.

THAT'S NOT ALL. THIS MEMORY KEEPS WORKING, EVEN WHEN IBM'S QUITS.

It's like having a built-in back-up main memory. If your resident IBM memory fails, 370/STOR 145 will keep going. Just throw a little switch on our memory panel, and the failed IBM memory is disconnected while 370/STOR 145 continues to run full speed. Need we explain the virtues of that attribute?

AND YOU CAN INSTALL ONE MEGABYTE IN LESS THAN A SINGLE DAY...

370/STOR 145 is a stand-alone unit. It connects to your CPU through plug-in connector cables. That makes it completely transparent. You can use all IBM hardware, software and maintenance without alteration. The interconnect is so direct that we'll get your first megabyte running in less than a day.

IN FAR LESS FLOOR SPACE THAN IBM OR OTHER MEMORIES NEED...

We are noted for our compact memories. They help us get orders, because computer sites have space problems, too. With 370/STOR 145, we get compact indeed: up to a megabyte in a single chassis, with power supply built-in. The result, if you have a 145 Mod 1, is more than twice the capacity in about half the space.

AT A PRICE THAT YOU CAN'T BEAT... UNLESS ALL YOU SHOP IS PRICE.

Cambridge sells value. That means the right performance at the right price. We've gone out of our way to build 370/STOR 145 as a memory product you can't beat in performance, regardless of the supplier. But we also know you want the right price—so we give it to you. Ask our local sales office to quote you our lease and purchase terms.

370/STOR 145. The newest product from Cambridge, a company that knows that its future depends upon the excellence of the products it builds for you.

CAMBRIDGE.

A good place to put your information.

360/CORE
Up to two megabytes of main memory for Models 22, 30, 40, 50, 65 and 67 processors in the System/360 line.

370/STOR
Up to four megabytes of main memory for the Models 145, 155 and 165 in the System/370 computer family.

EXPANDACORE-11
Memory expansion systems for all PDP-11 processors, featuring up to 30% speed increases. Two-way data save and interleaving.

EXPANDACORE-620
Up to 65K of main storage for all 620/i, L, F-100 and L-100 minis. Self-contained and self-powered 5¼" plug-in systems.

OTHER MEMORIES
Core, semiconductor and DOT data storage systems for OEM and End-user computer mainframe, controller, peripheral, terminal and auxiliary memory products.

Letters to the Editor

'Let the System Work'

(Continued from Page 11)

is judged to have adverse social effects, then this problem should be addressed directly, rather than by tampering with the price system. To be specific, if we agree it is bad that poor people cannot afford gasoline, then we should take steps to make it available to them by increasing their ability to pay.

I do *not* agree that we should impose some system of allocation which insures a supply of gasoline for them regardless of price, for the reason that not all people value gasoline equally. Increasing their ability to pay, perhaps by a subsidy, permits them to spend this on gasoline or not, *as they desire*. Their *choice* of where to spend the subsidy insures that if they choose to still forego gasoline, it will be in favor of some other commodity with higher satisfaction to them.

With respect to the other means of attaining equilibrium, I *do* believe that forcefully restraining demand is immoral. I object to the government telling me that I must slow down on the highway, that I may not travel on Sunday, that I must reduce my thermostat to 68 degrees or less. If the price of gasoline rises, I prefer to decide on my own whether to forego it or some other commodity in accordance with my personal preferences.

Similarly, the methods whereby supply may be increased directly generally involve the relaxation of some restriction which had been imposed for good reason (e.g., reduce air pollution, preserve the environment). Surely most people would agree the relaxation of these restrictions borders on social immorality.

So I submit that the price mechanism, with any other social adjustments considered after the fact, is the only moral way to reestablish equilibrium between supply and demand.

Before concluding, I would also like to comment on the other points of the column. First of all, a shortage of gasoline overseas does place additional demands on the domestic supply (for example, in order to supply our armed forces abroad who previously relied on local sources of supply). I do not believe the present shortage developed overnight, either. I recall fuel shortages and warnings last winter also. Many of the environmental measures we have been taking recently (e.g., controlling automobile exhaust emissions, converting coal-burning plants to oil) have been increasing the demand for oil. Finally, I believe the price of crude oil has been rising worldwide recently, led by the Mideastern producers.

I readily agree there will be increased pressures to build an Alaska pipeline, speed the certification of nuclear power plants, relax automobile emission controls and perhaps even relax the regulation of public utilities. These pressures are not necessarily the result of conspiracy, nor are they evidence of conspiracy; I fail to see any pressure for larger cars.

Without going into any protracted discussion on the importance of profits as attractors of investment in our economic system, let me just point out that nearly half the additional profits resulting from pure price increases (price increases not offset by additional costs of supply) will be recovered by the government anyway through the ordinary corporate income tax.

I would not object to the concept of additional gasoline taxes being imposed, but I would like to point out the high price of gasoline and resulting profits will attract investment in alternative technolgoies by either private or public (e.g.,

(Continued on Page 16)

The day Apollo XXIII landed on Jupiter.

Maybe it was a short circuit at Mission Control, or maybe a drop-out on the tape. The fact remains, it doesn't take much to turn A-OK into one giant goof for mankind.

What it does take is an astronomical effort to circumvent the possibility of error. And the easiest place to start is in your selection of computer tape. How? By specifying BASF.

At BASF, we go the extra distance to give you tape with no surprises. Take for example the special "clean room" environment in which our tapes are manufactured. It's just one of the ways we guard against surface debris, which could cause drop-out errors.

One more point. Our tapes don't cost any more than the competition's. You're already paying for BASF quality . . . you might as well have it. Write today for the whole story of how BASF tapes stack up against the competition. Remember, nobody makes better tape than the people who invented it. BASF Systems, Crosby Drive, Bedford, Mass. 01730.

When it's BASF...you know it's not the tape that goofed.

Letters to the Editor

'Let System Work'

(Continued from Page 14)

municipal) enterprise. So the system really does work to correct itself, if you just let it!

Ira W. Cotton
Washington, D.C.

'Economic Ignorance'

Your column is a startling revelation of economic ignorance.

Although "we" have not reduced imports from Canada, are you willing to ignore the fact that the Dominion of Canada is now taxing each barrel of crude exported to the U.S. at a rate of $1.90? Although "we" have not crippled our refineries, can you locate any idle refining capacity and match it with available crude oil? Do you realize how construction, drilling exploration and all related costs have increased since the last price increases were approved by the Federal Power Commission? Do you have any idea of the cost, time, complexity or enormity of the task presently required to construct a refinery or pipeline, even after you are able to outstrategy those who can (through government machinery) indefinitely delay the construction of such facilities at public expense?

To say it costs no more to produce, transport, refine or distribute scarce petroleum products, which are rapidly depleting, than it did at the time gas rates were set by the Federal Power Commission is irresponsible. Excluding the amount of state and federal tax included in the price of a gallon of gasoline, it now sells for 1930 prices.

No other commodity so vital to your daily life sells at such a bargain price. I am sure you are aware of the reduced efficiency of recently constructed automobile motors, thanks to emission controls. Were you to relate your personal consumption to earlier years and multiply that by the millions of autos in use, you would get an indication of the supply problem which has been thrust upon petroleum people.

Unless some positive steps are taken and solutions found to the energy supply, not only will the poor people be cold, dark and off the road, so will the rich, educated and socially prominent.

Your column would better serve mankind if it contained opinion based upon fact, aimed at the enlightenment of your readers and avoided conclusions such as your statement, "The whole thing is clearly a greedy conspiracy." I would prefer to be influenced by someone knowledgeable in his subject matter, with some practical suggestion for a solution to the problem.

Your suggestion that the surplus profit ought to be taxed away and used to build mass transportation, etc.: Do you consider the after-tax return on investment to any or all petroleum stockholders excessive? If so, I suggest you try to raise investment capital at those rates.

I would hope your future columns will address subjects more realistically and will not be so much slanted by your subjective mood.

L. E. Saunders
Controller
Husky Oil Co.
Cody, Wyo.

Yes, Mr. Cotton, I too hope that the system does "work to correct itself," and loud complaints from the victims are a vital part of the process.

Yes, Mr. Saunders, I consider the profits of the oil companies (many of which avoid heavy taxation) to be excessive, especially recently.

And I wish you gentlemen would tell me whether we are short on crude, or short on refining capacity, or short on honesty and truth? HG

The Yearly Shuffle

Once again we are going through the yearly asinine job of modifying programs to conform to the annual change performed by our federal bureaucrats on W-2 and 1099 Payroll Forms [CW, Dec. 5].

It would appear by this time we could have been furnished with a design that would require no further modifications and one that would lend itself to quantity purchases that would allow us to use the forms from one year to the next.

Willie Grafals
Stuttgart, Ark.

Users Wonder: How to Sort Out Data?

Measurement: Readability, Credibility, Usability

By Don Leavitt
Of the CW Staff

MORRISTOWN, N.J. Users have a two-fold problem in working with performance measurement tools, and the problem persists whether the installation is working with SMF data, software monitors or hardware probes, according to a survey conducted earlier this fall by the Boole & Babbage Users Group.

On a purely technical side, one user told BBUG President Barry A. Stevens, "We have tons of data, but it is difficult to sort out the ounces of information" that would be really useful.

As a broader problem, Stevens said, many users felt an absence of defined organizational objectives to which they could aim. Too often, he said, the technicians don't know what top management really expects of them, and therefore they are genuinely unable to use to good advantage the measurement tools they have.

In his survey, Stevens asked:

- What problems do you have in relating performance data to your management?
- What problems does your management have in using performance data?

Most of the users at the BBUG meeting held in Chicago in October answered at least one of these questions. The answers to either, Stevens noted, seemed to point to problems related to readibility, credibility and usability of the data.

Readability, he said, refers to the organization and presentation of data such that it becomes understandable to management and technician alike. Many of the reports generated by current performance tools are hard to read and provide no aid in evaluation, he felt.

Performance measurement tools often report data related to machine intervals, but since different methods of data collection and reporting can produce widely varying results, he went on, the credibility of performance data is often – and justifiably – open to question.

The usability of data once it is collected is often hampered by still other factors, he added. Many installations have, for example, sanctioned some sort of performance measurement effort, but without defining its scope. In some cases, the measurer feels he is powerless to even suggest a change once he has analyzed the data. Sometimes, he said, raw data is passed directly to management for a decision.

Better Presentation

Frustrations felt in current performance measurement efforts might be eased, he thought, through better forms for the presentation of data, possibly with Kiviat Graphs [CW, Oct. 3]; through clearer definition of the information needs and objectives of both the managers and the technicians; and through awareness of the potential impact of implementing change based on measurement and evaluation.

Stevens illustrated the separation of manager and technican with the results of a previous BBUG survey. In that instance, the users were asked to identify their system optimization parameters. Almost 40% cited channel balance; more than 20% aimed at CPU utilization; and just over 10% named head movement as their prime concern.

Only 2.6% said they were focusing on output scheduling, turnaround and job volume optimizing.

Stevens is with Allied Chemical and can be reached through P.O. Box 1039R, 07960.

Library Gives Fortran Users Alternative to Commercial T/S

STATE COLLEGE, Pa. – Fortran-oriented 360/370 users can gain support for commerical DP with the help of a library of 18 Alphanumeric Character Handling subroutines from Gabrielle Wiorkowski.

Fortran is not designed for the handling of alphanumeric data, but it may be the only realistic choice available to some time-sharing users. The newly available library should make in-house time-sharing a viable alternative to commercial time-sharing networks that already offer enhanced Fortran facilities, she noted.

Wiorkowski's routines appear generally to be facilities comparable to those of some Basic implementations, especially those extended beyond the original language developed at Dartmouth. Many of the current routines come in pairs, with complementary functions.

"Value," for example, converts a character string to a numeric value while "Char" does the reverse. "CVB" converts packed decimal to binary integer and "CVD" makes the opposite conversion.

But "Index" searches strings for a given character configuration, and ICMPRL functions rather like an IF statement, comparing data declared in Logical*1, and returns a code indicating the result.

Another group of the subroutines supports conversion of Julian and Gregorian dates, returns the current time of day, shows the CPU time used since the last inquiry, or writes a message to the console operator.

The individual routines vary in length, Wiorkowski said, from a few hundred bytes to a few thousand.

The entire library can be ordered, for $180, from 308 McBath St., 16801.

'Framework' Builds H200 Logic

RICHMOND, Surrey, England – Honeywell 200 users can have large sections of programming logic generated through minimal coding entries fed into the Framework "operating system" available here now and expected to be introduced in the U.S. in 1974 by Tritech Computer Services Ltd.

Framework is designed to process batches of transactions against a master file, with extraction and reporting as required. Currently tape-oriented, it runs on systems as small as 24K with disk for system software and three tapes for data files.

It is geared to supporting the three major elements of most commercial DP applications: input editing, file maintenance and reporting. Modular in structure, it will also sort transaction and report files, recycle through sorting, extraction and printing runs as required and create delivery notes and invoices for the work performed.

User programs are coded through a series of macros supplemented by a simple subset of Easycoder, Tritech noted. The programmer need only learn 15 commands since Framework performs all the complex logic which would normally require more extensive instruction sets.

User programming logic may be added to Framework but only at specific exit points, in order to maintain the modular approach built into the system.

While Framework is not yet actively supported by Tritech in the U.S., the company would be interested in hearing from both potential users and agents.

The company is at 90 Kew Road, Richmond, Surrey TW 9 2PQ.

Characteristic	DML	System 2000	IGIM	IMS II
Language Power	medium	very high	med. high	high
Language Flexibility	very high	medium	med. low	high
Language Interface Capability	medium	very high	low	high
Report Writing Capability	medium	low	very high	low
Ease of Use and Learning	very high	medium	med. low	low
Data Base Capacity	medium	medium	very high	high
Data Base Security	medium	very high	medium	medium
Hierarchical Structure Capability	medium	very high	low	high
Network Structure Capability	medium	very high	low	low
Query Capability	high	high	high	low
Self-Contained Computational Ability	high	low	medium	low
Ease of Updating	high	high	high	high

The capabilities of three data management systems on the Infonet system are compared with one another and with IBM's IMS, even though it isn't on the Infonet network. (Chart prepared by CSC)

Three Systems Added to Infonet

EL SEGUNDO, Calif. – By early next year, users of the Infonet remote-computing network will have a choice of three distinct data management systems to aid their applications work.

Data Management Language (DML) is currently on-line; Infonet's version of GIM, originally developed by TRW, is in limited release; and System 2000, developed by MRI Systems, Inc., is in pilot test, according to Computer Sciences Corp., which runs the Infonet operation.

These implementations differ from others of the same systems available elsewhere, CSC added, since the Infonet system software allows users to switch between batch and interactive modes, in any combination of languages, files, programs or systems.

The nationwide Infonet service is based at 650 N. Sepulveda Blvd., 90245.

Cobol Clinic – Part II

Storage, Run Times Can Be Controlled in 3 Areas

By Jerri Lynn Burket
Special to Computerworld

We have a small DP staff, with three programmers and two analysts, and we operate in a "small" environment, running batch work on a 360/25 with 2314 disks, under DOS. Nonetheless, by taking time to find out how the ANS Cobol compiler actually works, we've been able to control storage and run times in at least three areas: using the PERFORM statement, setting up basic print operations and initializing matrices.

Some programmers place all routines to be PERFORMed at the end of their programs. However, if each routine is placed at a point in the mainline where it would be "fallen through" rather than PERFORMed, it would take less core. If the "fall through" is the prime use of each routine, the repositioning may also improve run time for the entire program.

Saving Core, Time

The compiler sets up at least 24 bytes of instructions to execute a PERFORM. Putting a routine in-line saves both that much core and the time needed to execute those instructions.

In preparing reports, we've felt it took too much core to hold title and header lines, especially when they included many spaces. Now we're satisfied that when there are more than 10 spaces at the end of a line, these spaces should not be saved in Working-Storage at all.

The compiler sets up at least 24 bytes of instructions to execute a PERFORM. Putting a routine in-line saves both that much core and the time needed to execute those instructions.

Dropping the spaces will cause the MOVE to the print line to be from a shorter to a longer field. When an alpha or alphameric destination field is longer than the sending field, the compiler generates 10 bytes of instructions to fill the remainder of the field with spaces. As long as we need more than 10 spaces, it is less costly in core – but not in time – to let the system fill them through generated code rather than to store the spaces themselves.

Computational-3 or mixed-format matrices cannot have initial values assigned to them at compilation time; their initialization is usually accomplished by a loop in the housekeeping portion of a program. But there is another method that takes advantage of the way in which a MOVE (character) instruction is executed.

One at a Time

The assembler instruction used to move characters is executed from left-to-right, one character at a time. If the destination field and the sending field overlap, with the sending field preceding the destination field, the instruction can be used to propagate sending character(s) throughout the destination field.

For example, suppose sending field S is at positions 100 to 110 and destination field D is at positions 101 to 110. Let's suppose position 100 contains the letter "X." A move from field S to field D would cause the "X" in position 100 to be moved to position 101, the move from position 101 to 102 would move the "X" that has just been placed in position 101 to position 102; it would then be moved from 102 to 103, and so on.

The Cobol Clinic is intended to serve as a clearinghouse of ideas to make user programs more efficient. Reactions to Burket's proposals are welcome, as are descriptions of other areas readers have found to be critical to their own coding effectiveness. Reports of optimizing efforts would be of interest.

ANS Cobol would compile instructions to execute this move for the length of the shorter field, in this case D. The end result would be that every position in D would contain the letter "X."

The MOVE instruction can be used in this manner to propagate any number of characters. To take advantage of this in ANS Cobol, the destination field must be a subset of the sending field.

The application of this to matrix initialization requires that the matrix itself be a level other than 01. The OCCURS clause must not be defined in the same level as the matrix, since that would impose a length of one member on the matrix, and for our purposes, the length needed is the length of the entire matrix.

The matrix will not be the only subset; preceding it will be FILLER(s) with the same picture(s) as matrix members. These FILLERS are assigned the initializing values.

An example would be:

```
01 INITIALIZE COMP-3.
02 FILLER PICTURE S9(7)V99 VALUE ZERO.
02 FILLER PICTURE S9(5)  VALUE ZERO.
02 MATRIX.
   04 MMEBER OCCURS 150 TIMES.
      06 SUB-A PICUTRE S9(7)V99.
      06 SUB-B PICTURE S9(5).
```

The initialization of the matrix will be a simple MOVE INITIALIZE TO MATRIX.

The actual number of assembler instructions compiled is dependent on the length of MATRIX. (Maximum length for a MOVE instruction is 256 char./instruction. MATRIX is 1,200 characters long and the MOVE would generate five instructions of six bytes each.)

The loop to clear a very simple matrix takes over 80 bytes of code, which would be enough core to clear a matrix of 3,300 characters and still be taking less core, as well as less execution time.

When using the move to initialize, if the size of a matrix ever needs to be changed, the initialization routine will be automatically changed by the compiler without any intervention from the programmer.

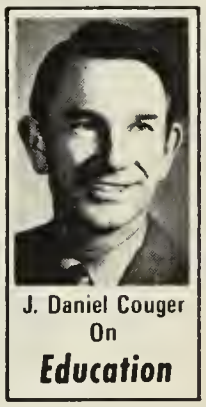
Burket is a programmer at Buckeye Pipe Line Co., Emmaus, Pa.

Development Period	Phases in System Development						
	I Documenting Existing System	II Logical System Design	III Physical System Design	IV Construction	V Test and Conversion	VI Operation	VII Maintenance and Modification
1st Generation	Forms flowchart	IPC MAP ← Decision tables →	General flowchart	Block diagrams Programming languages Compilers and assemblers	PERT CPM		
2nd Generation	SOP ← ADS →	← Information algebra →		Debugging aids Decision table translators	Automated PERT/CPM	Operating Systems	
3rd Generation		← TAG →	← PSL/PSA Automated ADS → System simulators SODA	Optimizers DBMS	Emulators Test data generators ← Hoskyns system →	Hardware/software monitors	Flowcharters Librarians
4th Generation	PLAN/SOP ←			ISDOS			→

Evolution of System Development Techniques

System Analysis Lags Hardware

Until very recently, the evolution of business systems analysis lagged behind hardware evolution by one full generation. During the first generation of business-oriented computers in the 1950s, systems analysts continued to use unit record-oriented analysis and design techniques. Between 1960 and 1970, however, computer-oriented techniques for systems analysis were developed.



J. Daniel Couger On *Education*

The gap has now narrowed to half a generation. Third-generation techniques began to emerge six years after the first installation of third-generation computers.

Systems analysis is concerned with the logical design of the new system: the specifications for input and output and the decision criteria and processing rules. The physical design phase determines the organization of files and the devices to be used.

Today's systems are complex in development. In the 1950s only subsystems were computerized, such as the payroll system. Today, payroll is a module in the accounting subsystem, which is only one of several subsystems in the finance system.

The systems of the 1950s were largely operational-level systems. They provided the information needed by first-level supervisors and their subordinates. Today's systems include the tactical (control) and strategic (planning) levels, as well. The thrust of system analysis/design efforts in the 1970s has been to expand systems horizontally and vertically.

The expansion in scope and sophistication of systems increases the complexity of system analysis and design. There are more "front-end" costs in designing for integration.

The figure above categorizes the four generations of system development techniques. The third generation initiated the use of computer-aided techniques, while the early approach was to computerize existing techniques. ADS (Accurately Defined Systems) processors were developed in the late 1960s. TAG (Time-Automated Grid) was developed in 1962 and automated in 1966. Decision-table processors were developed in the mid-1960s.

As could be expected, automating existing techniques proved to be a workable, but suboptimal approach. As a conse-

(Continued on Page 20)

System Analysis Lags, Cuts Hardware Gap

(Continued from Page 19)

quence, several organizations began research on problem statement languages designed to make optimal use of the computer's capabilities. One, at the University of Michigan, produced a problem statement language (PSL) which was, in the words of project director Dr. Daniel Teichroew, "a generalization of Information Algebra, TAG and ADS."

'Specs' Into Programs

Another, the Hoskyns System, permits automatic translation of system specifications into computer programs. A preprocessor automatically translates system specification matrices into Cobol programming statements, permitting program elements to be built, then consolidated into programs.

Enough research has transpired on fourth generation techniques to recognize the next step in the evolution.

As computer applications are being integrated, so are techniques for each of the phases of system development. A natural extension of computerized problem statements is translation of those statements into programming language statements.

However, to produce a complete system, not just portions of the system, a system optimizer must be included in the process. Optimizers of this type are already operational, but only as independent modules. The fourth-generation approach links these subsystems into an integrated whole.

The ISDOS (Information System Design and Optimization System) project at the University of Michigan is designed to produce such a system. While completion of the project is some time away, a sufficient number of modules have been designed and tested to prove the validity of the approach.

The systems analysis techniques shown in the figure above are described in a new book: *System Analysis Techniques*, J.D. Couger and R.W. Knapp, ed., John Wiley and Sons, Inc., 605 Third Ave., New York, N.Y. 10016.

Couger is professor of computer science and management at the University of Colorado.

Printer Makes Music Into Braille

LOUISVILLE, Ky. – Music can be translated into Braille. The problem is in finding people willing to learn the art. And to this end, the American Printing House for the Blind (APH) has its computer system preparing music for such conversion.

The project, sponsored by the Library of Congress, began in May 1971. The input system consists of a music typewriter-to-card punch machine capable of encoding both music symbols and alphanumeric data in the standard music format.

Programs to translate this data into Braille music, while still under expansion and refinement, currently consist of some 350,000 bytes of core storage and require several runs on an IBM 7040, according to William Watkins, an APH official.

Because the APH has been translating literature to Braille since 1964, Watkins said, a Braille output system had already been developed prior to the music project.

Data People Still in Demand

NEW YORK – The demand for telecommunications personnel continues to be strong with salaries on an upward trend, according to a survey released by Personnel Resources, Inc.

The demand for "user personnel" such as corporate communications directors and analysts is higher than in any year since the 1970 recession, the report said. It cited "a number of openings" in this category at salaries up to $30,000.

Among the new job specialties is the network manager who typically works with a large terminal system, the report said. Financial and manufacturing companies have been "especially interested" in communications users while transportation firms and the airlines are "not as strong" in interest as they once were.

One possible effect of the energy crisis will be an upsurge in requirements for communications engineers and telecommunications systems analysts from the energy industry including power utilities and gas companies, the report said.

According to the survey, a communications director with supervisory responsibility and "heavy data communications" experience now earns between $17,000 and $24,000. A senior systems programmer working on a telecommunications network earns between $14,000 and $18,000, while a programmer working with a message-switching net averages between $12,000 and $15,000.

In most categories, salaries in the New York area averaged higher than elsewhere in the U.S.

The survey is free from Personnel Resources at 342 Madison Ave., Suite 1234, 10017.

2-Second Turnaround

$45/Mo CRTs Handle Flights

By Patrick Ward
Of the CW Staff

SAN DIEGO – When a desire to provide faster service caused Pacific Southwest Airlines (PSA) to double the size of its reservations room here, not all the reservationists could still see a wall screen with flight data on it.

So, out of necessity, the airline had to abandon its old system and provide its reservationists with their own CRTs.

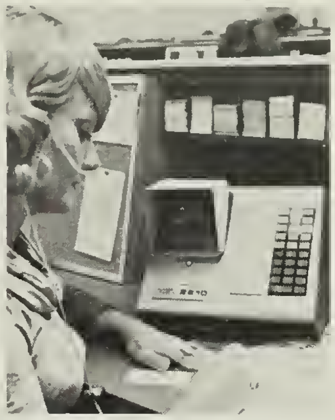
PSA chose to lease 141 Bunker Ramo 2210 CRTs with three-inch displays. The terminals are driven by an NCR 101 in the same building.

Cost was a big consideration in choosing the Bunker Ramo equipment.

Cost the Main Factor

"To be perfectly blunt about it, we couldn't find any others that came close to the price of Bunker and that was really the primary factor," said Jack Duffy, PSA's systems and development vice-president.

The small screen size gave PSA



It takes the PSA computer about two seconds to respond with a display on the CRT terminal.

pause at first, Duffy admitted. "I think when we were first looking at it all of us had reservations here because it looked so small," he said.

However, "It seems to have a very good image," he remarked. "It's kind of like a TV – if you're up close to a small TV it's really just about as good as a 21-inch unit."

Bunker Ramo offers users ways to expand to larger screens while keeping the same controllers, Duffy said. The only reprogramming PSA would have to do would be to take advantage of the larger screens.

PSA is a California commuter-type airline that does not interconnect with any other carrier, Duffy remarked, "so we didn't have as much information as a trunk carrier would have to put in."

The Bunker Ramo terminal has alphanumeric keys, but these aren't arranged in a typewriter keyboard. The reservationists use it as a terminal input device, putting in flight information and updating the flight inventory.

When a flight is sold out, the CRT screen displays up to four alternate flights.

The previous system had not done this, thus necessitating the big board for operators.

"Our big problem is servicing the customer as fast as we can but not having the phone tied up too long," Duffy remarked.

The previous system did pretty much the same thing, Duffy said, and was only slightly

User Casebook

slower, but did not offer the CRT's visual check on input.

That earlier system was all NCR and consisted of a 315 mainframe and "customized adding machines" converted for on-line terminal use.

Actually, "We're glad we've been able to keep the costs down as much as we have to accommodate the expansion of our telephones," Duffy noted.

Dea th of the Big Board

It was the expansion of telephone service that created a much larger reservations room and so marked the demise of the big board.

Lease price for the new system including CPU is about $12,000/mo, Duffy said, or about $2,000/mo more than what PSA was paying for the previous system before purchasing it.

The Bunker Ramo terminals themselves cost about $45/mo each, including buffers and controller.

Regarding downtime both from terminals and computers, Duffy commented, "We've been very agreeably surprised; it's just been remarkably trouble-free."

M4000 Front End Eliminates Software

By Ronald A. Frank
Of the CW Staff

EL SEGUNDO, Calif. – A front-end transmission system that is compatible with 360 and 370 mainframes and supports an array of IBM and non-IBM terminals has been introduced by Computer Transmission Corp. (Tran).

Teleprocessing software normally needed to distinguish between remote and local devices is not required. And "in most applications" the user does not have to worry about writing programs to accommodate the polling, queuing and querying of remote devices coming through the I/O portion of the host CPU, the spokesman said.

The Multitran 4000 minicomputer front end provides communications users with many of the full-duplex capabilities announced by IBM for its Synchronous Data Line Control (SDLC).

The M4000 is plugged directly into the multiplexer of the host CPU. The unit at the central site is called a channel extension unit (CEU) and can transmit data over voice-grade or wideband facilities to a remote device interface unit (RDIU). The RDIU controls its terminals or other devices as if it were in the same room as the mainframe.

In eliminating software entire remote data links with their associated hardware appear as familiar IBM peripherals to the 360 or 370, according to a Tran spokesman.

On a price comparison basis with IBM equipment, Tran said a Multitran 4000 system provides similar capabilities as 360/20 "terminal systems" used with 270X/370X communications controllers. Using this rather specialized comparison, a Tran system of three terminals, of the type available from Data Products, Mohawk and Tally, would cost about $200,000, the company said. The IBM system would cost about $300,000, Tran said.

Storage Savings

Since each remote device is supported as a local unit, there "is no need" for communications support packages such as the IBM access methods, Tran claimed. This also results in a storage savings at the mainframe.

The M4000 terminal system requires that the operating system support either 1403 or 1443 printers, the 2540 or the 2501 card reader and the 1052 console. The user can go from one of these systems to another, the company said.

"Any device" can be attached to the terminal without support for that device by the CPU. For example, a key-to-tape unit might appear to the CPU as a card reader, the company said.

A basic CPU costs $30,500 while prices for the RDIU start at $22,500. Lease prices are also available from the firm at 2352 Utah Ave., 90245.

Univac Has 201-,202-Type Compatible Data Modems

SALT LAKE CITY, Utah – Univac Communications and Terminals Division has introduced the U-201 and U-202 modems.

Both are voice-band data sets which will provide speed support capability up to 2,400 bit/sec on both switched or leased lines, and offer compatibility with Bell System 201B and 202 data sets.

The U-201 is designed for synchronous serial data transmission at 2,400 bit/sec on the dial-up or unconditioned private lines. The terminal interface is RS 232C-compatible.

The U-202 is designed for serial asynchronous data transmissions at speeds up to 1,200 bit/sec on dial-up or 1,800 bit/sec on C-2 conditioned private lines.

Both the U-201 and U-202 offer diagnostics such as loop test, self test with error injection capability, auto answer, and half or full duplex capability.

Charges including maintenance for these data sets under the standard Univac one-year rental agreement are $55 for the U-201 and $40 for the U-202.

Purchase prices are $1,720 and $1,200. Under a 60-month lease discount plan, monthly charges are reduced by 25% of the monthly equipment charge. Customers may convert from the standard 12-month plan to the extended-term lease at any time.

6250 BPI? Epoch 4 i

Epoch 4 was far ahead of its time when Graham Magnetics developed it.

So if you're getting ready to phase in the newest generation of high-speed, high-density drives, you can rest easy as far as computer tape goes.

Epoch 4 users are
because its high ther
face friction and ext
enable it to perform ju
high speed drives as
6250 BPI? Epoch 4

s ready when you are.

an enviable position,
al properties, low sur-
-high packing density
as well at 6250 BPI on
has at 1600 BPI.
s ready when you are.

GRAHAM
MAGNETICS
Graham, Texas 76046

For Data Collection, Transmission

Universal CRT Is Field-Adaptable

SANTA ANA, Calif. – Dasyn International has introduced a field-adaptable "universal" CRT terminal with processor that can serve as either a data collection or communication terminal.

The Dasyn 101 is now available as a two-way, half-duplex communication terminal for use with Bell 202C modems, and as a key-to-cassette unit.

Key-to-disk, key-to-floppy disk, tape-to-printer, CRT-to-printer and on-line terminal versions will be available in the near future, the firm stated.

The basic unit is a CRT display terminal with a keyboard for data entry. The terminal's subassemblies are designed to be electronically and mechanically independent so that function cards can be changed without affecting the rest of the unit, the firm stated.

Processor, memory and peripheral control functions are on 4 in. by 6 in. circuit cards that plug into edgeboard connectors on a motherboard. The motherboard provides all electrical interconnections between functional modules. In the present configuration, there are 12 connectors, 10 of which are available for peripheral control, the firm stated.

The unit's processor provides 2K characters of buffer storage, with additional memory optional.

The basic unit with keyboard, CRT and processor costs $3,950 with delivery in 90 to 120 days from the firm at 2800 Main St., 92707.

Lexiscope Display Plugs Into Novas

WALTHAM, Mass. – Lexicon, Inc. has brought out a display terminal for use with any Data General minicomputer.

The Lexiscope 2000A terminal operates under CPU program control. The control and interface electronics are contained on a plug-in board for the Nova which Lexicon furnished along with a basic subroutine library.

The basic system includes a 2K-char. random-access display memory in an 80-char. by 25-line high format, a fully addressable cursor and a 200 kchar./sec read-write speed.

The Lexiscope 2000A with plug-in interface costs $2,095. Delivery is four to six weeks for standard systems and eight to 10 weeks with the upper-lower case option. The firm is at 60 Turner St., 02154.

One-Piece Kit Converts Model 33 to Sprocket-Feed

SANTA MONICA, Calif. -- TTS has a sprocket conversion kit for Model 33 teletypewriter users.

The SMK-802 modification kit converts any Model 33 from friction-feed to sprocket-feed, the firm said, and is primarily for use with fanfold paper and non-form feed applications.

The conversion kit consists of a one-piece platen assembly. The friction-feed platen is removed with four screws and the SMK-802 assembly is put in its place using the same four screws, according to TTS.

The SMK-802 kit costs $150 with delivery in 30 days from the firm at 2928 Nebraska Ave., 90404.

SYSTEMS & PERIPHERALS

Bits & Pieces

Unit Films 60 Page/Min On 16mm Microfilm Camera

ST. PAUL, Minn. – Users can film 60 standard printout pages a minute onto 16mm microfilm using the new computer stationery console (CSC) for the 3M 4000 microfilm camera.

The CSC can accommodate forms up to 14 inches wide, with a 12-inch page length and includes a supporting cabinet mounted on casters for easy mobility. There also is a slide-away paper feed and stacking assembly, a clip-on paper guide and a replacement document carriage assembly to insure accurate feeding and registration of stationery. The CSC costs $665, and the previously announced camera costs $1,720.

Switching from single document feed to continuous stationery takes only a few seconds. No special training is required to make the transfer, according to the company. The 3M Microfilm Products Division can be reached through Dept. Mi3-70, P.O. Box 3386, 55101.

IBM 360/65 Users Can Double Main Storage Capacity to 2M Bytes

CONCORD, Mass. – Users of IBM 360/65s with an IBM 2361 Large Core Store attached can double main storage capacity to 2M bytes with Cambridge Memories, Inc.'s 360/Core 65.

A special addressing technique permits the add-on to be installed between resident main memory and the LCS, and in the event of a memory failure, an operator can remove any 256K-byte storage module of the add-on while maintaining continuity of addressing from zero through the maximum LCS memory position.

A typical 512K-byte unit attached to a 512K-byte IBM memory costs $100,000 or $3,500/mo on a three-year lease.

Floppy Disk 3740-Compatible

SANTA ANA, Calif. – The Series 61 floppy disk system is IBM 3740-compatible and is supplied with all hardware including cables to install and operate the system. Software includes diagnostic and driver subroutine packages; installation instructions and operation and maintenance manual are supplied by the vendor Applied Data Communications.

The controller installs in a small peripheral controller slot or wired system unit.

Diskette capacity is 242K bytes in IBM-compatible format. Transfer rate is 242 Kbit/sec.

Price for a single drive system is $3,750 with availability for PDP-11 interface set at 45 days. Systems operating with the PDP-8/e and Data General processors are available in 60 days. The firm is located at 1509 E. McFadden Ave., 92705.

Printer Can Hit 9,000 Line/Min

By Vic Farmer
Of the CW Staff

STAMFORD, Conn. – The Uppster Corp. Model II non-impact printer combines xerographic plain paper techniques with reduced type size to obtain 132 printed columns on 8-1/2 in. by 11-in. paper at a rate of 4,340 line/min. Data of 81 print columns, for example, runs at 6,927 line/min; 63 print columns run at the effective speed of 9,000 line/min. The Model II printer prints a page at a time – column by column – instead of the normal line-by-line printing methods (see figure), and can print up to 160 character-wide data at 3,500 line/min effective speed.

An interface to 360/370 equipment is supplied by Data General and is designated the 4025 interface consisting of a software driver and interface hardware. It costs $12,000 to $13,000 with this configuration.

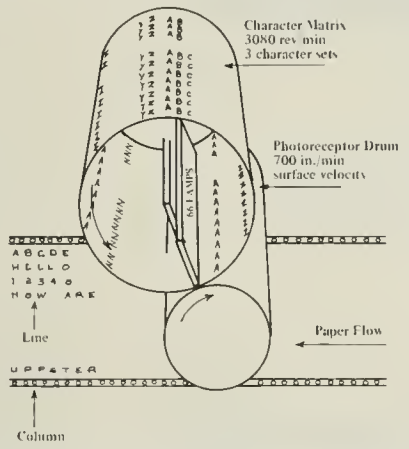
50% Cheaper

The total price of printer and interface is about 50% less than the equivalent Xerox equipment, according to the firm.

The user can select the number of copies necessary up to 99 either manually or under computer control. While a 48-character font is standard, custom fonts with up to 175 characters are optional, but print more slowly, and can be changed by the operator.

To achieve the speed in printing, the incoming data is inserted into a buffer page memory, character by character, on a line basis. Data is read from the memory for printing on a column basis, and characters are exposed through a mylar character matrix onto a rotating photoreceptor drum.

The photoreceptor drum using a xerographic printing process transfers the print image to the paper by means of dry ink or toner, and the image is then fused or fixed to the paper.



In the Uppster printer, 66 Xenon flash lamps print the same character where needed in one 66-line long column through a rotating mylar character matrix onto a rotating photoreceptor drum. The drum then transfers the image by means of a dry power ink to the paper. Printing is horizontal, not vertical.

Paper forms varying from between 3-1/2 inches to 9-1/2 inches between sprocket perforations can be handled by the printer. The printer is priced at $27,500 each with OEM discounts available from the firm at 845 E. Main St., 06904.

158, 168 Easy Off

WHITE PLAINS, N.Y. – IBM's new Power Warning Feature provides for an automatic interrupt and permits implementation of orderly shutdown and recovery procedures following power line disturbances on IBM 370 models 158 and 168 supported by an uninterruptible power supply (UPS).

Many users have installed or are installing UPS which shield their systems from power line disturbances. This customer-provided UPS, when equipped with a power line sensor, gives automatic warning to the CPU via the Power Warning Feature whenever utility power is beyond specified limits, according to IBM.

The Power Warning Feature accepts an external signal from the UPS sensor when the utility power is below 18% of rated voltage and presents an automatic interrupt to the control program. Combined with OS/VS or OS/MVT programming, the feature provides support for:

- Turning on the power warning bit.
- Timed delay prior to intercept.
- User intercept option.
- Main storage Dump/Restore.

The feature will function on systems having either full or partial UPS protection. If the customer provides UPS power to handle his full system (CPU, channels, control units, I/O, etc.), the user intercept option permits the user to develop "ride thru" and "quiesce" procedures and programs suited to his particular operation. These must be accomplished within the capacity of the UPS system provided, however, and may at the user's option conclude with a transfer to the "dump" routine.

If the customer provides the minimum amount of UPS power (CPU, channels, control units and I/O on one channel), the system functionally operates the same as with full protection. Use of the user intercept may be less attractive, however.

Operating system programming support will be provided for OS/MVT, OS/VS1 and OS/VS2.

OS/MVT and OS/VS will support the Power Warning Feature capability to detect interruptions in the electrical power supply, provide an intercept for user-implemented actions, and provide a facility for saving and restoring the contents of main storage. First customer shipments of the feature are scheduled for March 1974.

Monthly rental is $125 with the purchase set at $5,000.

STC Adds Univac Tape Interface

LOUISVILLE, Colo. – Storage Technology Corp. has successfully interfaced its 3400 tape series to Univac CPUs through its new 3820 interface controller recently installed at Keydata Corp., a service bureau using twin Univac 494s in Watertown, Mass.

The 3820 interface uses a 16-bit Prime 200 minicomputer in front of STC's standard 3800-III IBM-compatible tape controller.

This interface allows direct plug-to-plug connection to the word-parallel interface of the Univac 418, 494, 1106, 1108 and 1110 CPUs.

Using the 3820 interface Univac users can attach STC 3430, 3450, 3470 and 3480 tape drives to replace their Uniservo 6c, 8c, 12, 16 and 20 tape drives.

The 3400 series, in addition, is field-upgradeable to 6250 bit/in. density, and this 6250 option is scheduled to be available by the fourth quarter of 1974.

The STC drives, of which nearly 6,000 are presently installed in IBM sites, offer 75-, 125-, 200- and 250 in./sec speeds with a mix of 7 or 9 track; 556-, 800-, 1,600 bit/in. density, and phase encoding and NRZI formats.

Two-year lease price for a 3820 controller and eight 3450 tape drives is $4,570/mo including maintenance; $189,600 purchase. Deliveries are being scheduled starting in two months from the firm at 2270 S. 88th St., 80027.

FFT Processor Faster

NORTHRIDGE, Calif. – Spectra Data, Inc. has introduced its System '900,' a multichannel Fast Fourier Transform processor which is a stand-alone plug-in hardware processor designed to fit any computer.

A major advantage of the System '900' is that it is 100 to 200 times faster than the software approach in the Fourier Transform, according to the company.

Spectra Data has designed Command chain programming into the 900 so that the overall computation or array operation can be performed in a continuous chain of sequences without a computer.

The price, depending on options selected, ranges from $65,000 to $160,000.

Spectra Data is at 18758-6 Bryant St., 91324.

GA Sends Out SOS Processor on 1 Chip

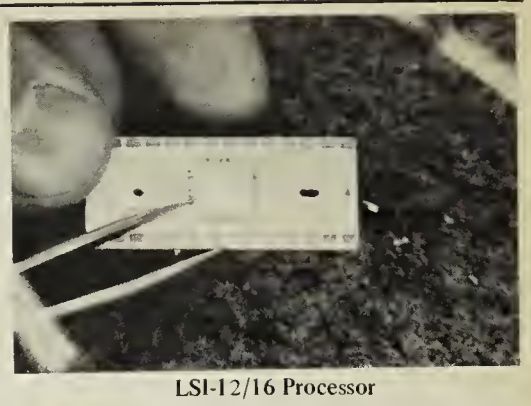
ANAHEIM, Calif. – General Automation, Inc. (GA) has introduced its OEM LSI-12/16 minicomputer featuring a complete computer processor on a single semiconductor chip using silicon-on-sapphire (SOS) technology.

The LSI-12/16 is an eight-bit microcomputer with from 1K to 32K words of semiconductor memory and an instruction execution cycle time of 2.64 μsec.

The machine is available in two configurations: as a board-only system, packaged with memory, operator console and system operation features all on a single 7-3/4-inch by 10-inch printed circuit board; and the same board packaged in a system enclosure with power supply, battery backup for the semiconductor memory and card slots for additional I/O boards.

Its board-only configuration with 1K of memory costs $495 in minimum quantities of 1,000 units per year. Customer deliveries are scheduled to begin in late January.

The use of technology has enabled GA designers to place 2,000 gates on a single chip with an area of about 4,000 pico-acres. The equivalent of 4,000 to 5,000 transistors is on this one chip, which means less power is required, speed is greater than that of several linked chips, and reliability is improved in use, according to GA.



LSI-12/16 Processor

The LSI-12/16 has full minicomputer organization, performance and support, and is compatible with the SPC-16 family of minicomputers.

Although all semiconductor memory has a high volatility – that is, all data in memory is lost in the event of a power failure – the micro is protected with an auxiliary battery backup system that activates immediately upon loss of power to retain the contents of memory for up to 15 hours.

Up to 2K of semiconductor memory is provided on the LSI-12/16's processor board and an additional 2K of RAM or 8K of ROM or programmable read-only memory (Prom) can be added via a piggyback board. Memory is expandable to 32K in increments of 1K, 2K, 4K or 8K.

GA has also developed a new "ROM Patch" system that, in effect, lets a user hardware retrofit new instructions to a ROM.

The LSI-12/16 has 12-bit parallel addressing which allows direct addressing of 4K words without paging. The mini also has eight 12-bit hardware registers, 52 basic commands, a processor-controlled priority interrupt system and a teletypewriter interface.

Standard control function facilities include a relative time clock, external priority interrupt, 16-bit parallel I/O bus, integral console and an ROM-based console function program. In addition to the memory battery backup, the LSI-12/16 has a number of fail-safe features that protect the system from the costly consequences of power transients, power interruptions, component failures or program bugs. These include the operations monitor alarm, system safe line, system restart line, power fail detection and automatic restart.

The high speed of n-channel SOS allows the LSI-12/16 to execute stored programs in excess of 190,000 instruction/sec.

GA is at 1055 S. East St., 92805.

Controller Designed For Process Control

WAKEFIELD, Mass. – The AN7000 PCCC programmable controller is designed for builders of measurement and process control systems with A/D converter, processor, random-access and read-only memories, and I/O bus included in the $600 price.

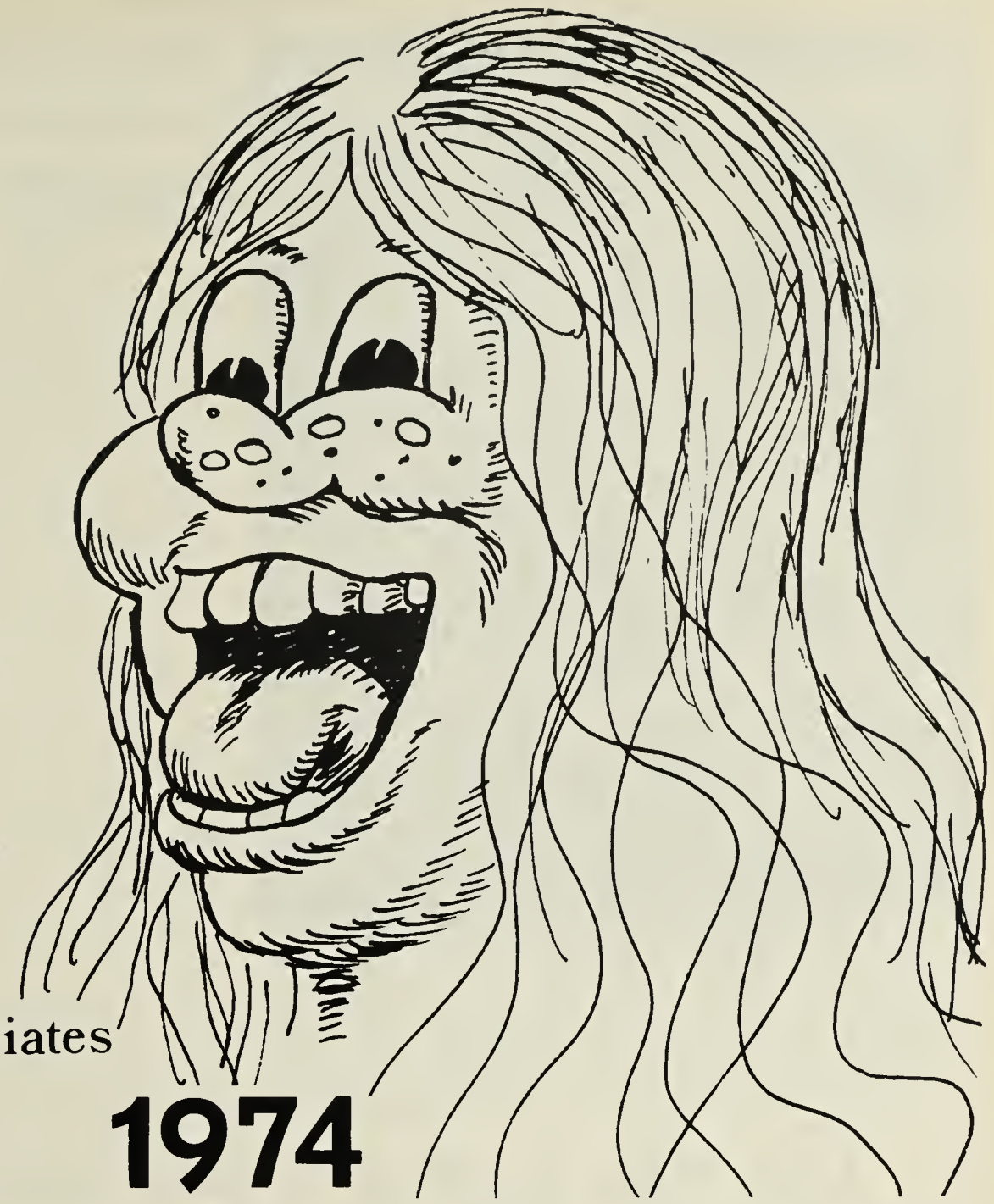
New OEM Products

The basic 160 four-bit word random-access memory can be expanded to 624 words, and the programmable read-only memory can be expanded from 768 eight-bit bytes to 4K bytes, according to the manufacturer, Analogic, Inc.

The instrument takes signals from transducers of force, weight, pressure, flow and temperature sensors, digitizes them, manipulates and acts upon them according to instructions from a number of programs, and produces output for display, transmission or direct control.

Four device address lines enable the system to communicate with 16 external devices, such as teletypewriters, video terminals, printers, solenoid and servo valves, switches and other computer systems.

The company is at Audubon Road.



Marcus Powell Associates
2694 Doidge Avenue
Pinole, California 94564
(415) 758-6080

1974

JAN			1	2	3	4	5
	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
	27	28	29	30	31		

FEB						1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28		

MAR						1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
	31						

APR		1	2	3	4	5	6
	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30				

MAY			1	2	3	4	
	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30	31	

JUN							1
	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30						

JUL		1	2	3	4	5	6
	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30	31			

AUG					1	2	3
	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	29	30	31

SEP	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30					

OCT			1	2	3	4	5
	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
	27	28	29	30	31		

NOV						1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30

DEC	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31				

Doctors Turn to Computers In Helping the Handicapped

Study Seeks Cause Of Stuttering

AUSTIN, Texas – Does the brain function differently in stutterers and non-stutterers? Dr. Harvey Sussman, assistant professor of linguistics and speech communication at the University of Texas, is using a computer to try to find out.

Sussman's theory rests in the fact that the left side of the brain handles the process of speech. In stutterers, Sussman thinks, the brain's left hemisphere may not have complete control of the speech process or dominance over the right side. In other words, both sides of the brain may be trying to tell the tongue and jaw what to do.

'Tracking Technique'

To study the brain's hemispheres, Sussman has devised a method called the "tracking technique." He measures the movement of the jaw using a transducer – a flat strip of metal resting below the subject's chin. When the subject opens his mouth, a low frequency sound is produced by converted electrical voltage. When he closes his mouth the pitch is high, Sussman said.

The sound made by the subject's mouth is played into one ear. In the other ear, a similar tone is played – this one from a computer that creates pitched tones at random. The idea, Sussman said, is for the subject to listen to the computer's tone and try to match it by moving his mouth and transmitting a similar pattern.

On the Right Track

Sussman hopes to find that stutterers cannot track better with one ear, as non-stutterers can.

"I think there is an organic, physiological reason why people stutter. Looking into the future – and this is really dreaming – possibly a person could be cured of stuttering in the laboratory," Sussman said.

Artificial Arm Is More Natural

SAN DIEGO – The computer may soon allow the seriously handicapped amputee to execute remarkably fluid and sophisticated movements, thanks to a newly designed computer-controlled artificial arm.

The artificial arm, still in the engineering development stage, was discussed by Dr. F. Ray Finley of Temple University's Health Sciences Center in Philadelphia at the Society for Neuroscience meeting.

The device is based on the knowledge that normal arm movements are guided by impulses that start in the muscles of the back shoulder and upper back, Finley said. When activated by the brain, these muscles emit electrical signals.

The computer device that controls the artificial arm reads the pattern of these electrical signals from seven electrodes taped to the shoulder and back. It translates this pattern of electricity into the specific arm and wrist movements the wearer wants to make.

Finley said the program allowing this natural movement was developed by recording the electrical signals produced in the skin of six non-handicapped persons while they moved their arms in a wide variety of natural movements. The movements were reported and varied hundreds of times to give the computer the full range of possibilities. The program is also designed to rule out false moves that might be triggered by such extraneous signals as a sneeze.

CI Notes

Burroughs Banks Swiss Order

DETROIT – Burroughs Corp. has received an order valued at $20 million from the Societe de Banque Suisse for the purchase of six B3700 computers, 200 system and communications processors and 1,000 on-line terminal units including TU 700 teller terminals and TD 800 displays.

Installation is expected to begin toward the end of 1974.

Ampex Hikes Tape Drive Prices

MARINA DEL REY, Calif. – Ampex Corp. has increased prices 12% to 15% on TMX and TMZ tape drive series manufactured for the OEM market.

Ampex noted that price increases passed along to the company from its suppliers during the past 18 months have added significantly to overall product cost. The result has been an increasing erosion of profit margin in the computer products industry, Ampex said.

Patient Monitoring to Outpace Field

PALO ALTO, Calif. – Sales of patient monitoring equipment will outpace the rest of the medical electronic equipment market, reaching $160 million by 1977 with an annual growth rate of 19%. Total market sales will reach $1.1 billion in 1977, reflecting an annual growth of more than 13%.

With more than 100 companies competing for the market dominated by Hewlett-Packard and General Electric, several are expected to succumb in the next few years, according to a study conducted by Creative Strategies, Inc.

Honeywell Posts Japanese Orders

WALTHAM, Mass. – Honeywell's associate Japanese computer manufacturer, Tokyo Shibaura Co. Ltd. (Toshiba), has received orders over the last two years for 40 Tosbac 5600 Series computer systems in Japan worth an estimated $60 million.

The Tosbac 5600 is equivalent in size, value and general performance characteristics to the Honeywell 600 Series.

Supershorts

The Computer Timesharing Services Section of Adapso has been renamed the Remote Processing Services Section (RPSS).

– – –

Redactron International has signed a sales and service agreement for its editing and communicating typewriters in France with Japy France.

– – –

Cognitronics Corp. has agreed to an exclusive marketing arrangement with Oficina Tecnica de Programacion Y Tabulacion S.A., for the Cognitronics System/70 OCR, in Peru, Brazil and Venezuela.

– – –

Data Systems Division of Gould, Inc. has entered into an agreement with Nanotek International, Inc. for marketing its products in Western Europe.

– – –

Autographics, Inc. has signed Hughes Aircraft Co.'s Industrial Products Division to market its computerized pattern grading and marker making system for apparel manufacturing.

– – –

Varian Associates plans to construct a 25,000 sq-ft manufacturing facility near Galway, for the production of magnetic components and hybrid circuits.

– – –

Computer Automation, Inc. is closing its facilities from Dec. 22 to Jan. 2 to observe the holiday period.

Report Calls Scene 'Confusing'

U.S. Minimakers Stand to Gain in Japan

By Molly Upton
Of the CW Staff

TOKYO – U.S. minicomputer makers stand to benefit from the currently "confusing" and crowded scene in the Japanese mini market, according to *EDP Japan Report* (EDP/JR) newsletter.

The report foresees increasing demand to link up with foreign manufacturers, which will provide overseas makers with "the golden opportunity" to expand their shares in the Japanese market.

The minicomputer industry has become the "Achilles heel" of the Ministry of International Trade and Industry's (Miti) policy of promotion of Japan's computer industry, which has thus far been geared primarily to makers of general-purpose computers, according to the report.

Since the beginning of the year, several new problems have emerged for the industry, including: the government's policy of capital and import liberalization for computers; emergence of microcomputers; and moves toward a reorganization of the minicomputer industry, the report said.

Japanese minimakers have been protected by the government policy of nonliberalization and their products "therefore are inferior to foreign makers in technological and other respects."

Part of the problem stems from the fact that while Miti carried out protectionist restrictions on foreign capital investment, it "failed to take measures for fostering manufacturers, including IC makers, to facilitate the growth of minicomputer manufacture as an independent industry."

The minimakers, the report said, are calling upon the government to remedy their treatment as a "blank spot" in the government's policy and to take strong protective measures.

However, at the same time, they are anticipating the government power of administrative guidance and protection will decline after the capital and import decontrol.

Overseas Connection

As a result, according to the report, the minimakers are studying the possibility of mergers or associations with overseas minicomputer makers and evolution into system makers using imported minis, and advancing into the microcomputer field.

Currently, the number of suppliers exceeds demand, but a four-fold market growth to 21,000 units could occur by the end of March 1977, the report said. The relative lack of OEM customers is one factor inhibiting market growth.

Twenty-two companies are engaged in the manufacture and sales of minicomputer CPUs in Japan and 16 companies import foreign minis for marketing, for a total of 38 firms now selling minis, the report said.

As of the end of March 1973, the installed base of minis stood at 3,000 units, valued at about $100 million, according to *EDP/JR*.

The newsletter estimates the demand in fiscal 1973 will reach about 2,500 to 3,000 units, which amounts to an average of 66 to 78 units per firm.

Ranked in terms of installed base, the leader is Hitachi, followed by Fujitsu, Oki Electric Industry and Japan Minicomputer.

Sales break down into 50% end user, 25% OEM and 25% of systems incorporating minicomputers.

"The Japanese market is characterized by the small weight of OEM sales and the fact that the manufacture and sales of systems incorporating minicomputers must be undertaken by the minicomputer makers themselves," the report stated.

With the rapid entry of firms into the mini arena, fierce price competition evolved. By 1972, "prices were virtually dictated by users," the report said, as minimakers resorted to bargain sales when they developed new architecture, such as the PDP series, according to the report.

Until fiscal 1971, the average price of a mini was $10,000, but since fiscal 1972, units priced at $5,000 have become the most popular models.

The price reduction has boosted the rise in deliveries, "but the sales total has not yet reached such a level that the manufacture of minicomputers can be termed a full-fledged industry," the report said.

The impending capital liberalization would allow such firms as Digital Equipment Corp., which has rejected Miti's request to enter into a joint venture with a Japancse firm, to expand its market share "at one stroke upon capital liberalization."

EDP/JR cites the emerging microcomputer area as a possible encroachment upon the mini market.

The trend within Japan to reorganize the mini industry also presents a move to counter Miti's efforts, the report said.

Miti has attempted to promote Japan Minicomputer, jointly organized by seven firms and backed by technology from Data General.

The formation of Panafacom through the merger of the minicomputer divisions of Fujitsu and Matsushita Communication Industrial is indicative of the new trend to compete with Miti's chosen firms, it noted.

U.S. DP Exports Pass $1 Billion, Boosting Balance of Payments

By E. Drake Lundell Jr.
CW Washington Bureau

WASHINGTON, D.C. – U.S. exports of computer equipment passed the $1 billion mark in August of this year, while imports of such equipment were less than half that, making computer products a mainstay of the nation's newly found favorable balance of trade.

The August shipment of $138.9 million worth of computer equipment boosted the yearly total to that date to $1.074 billion – $200 million more than at the same time last year when the shipments through the end of August amounted to $867.6 million, according to the Department of Commerce's Bureau of the Census.

And the August shipments alone were running at a rate that was 30% higher than shipments in the same month a year ago, pointing to a banner year for U.S. shipments of computer equipment.

The August 1973 shipments of $138.9 million were up dramatically from the $100.9 million shipped in the same month last year and follow July shipments of $138.2 million, which were also up significantly from the $105 million shipped in the same month in 1972.

Imports, however, were also up from the previous year, even though the figures are harder to classify since computer imports are thrown in with imports of other office equipment in the Census Bureau figures.

In total the U.S. had imported around $500 million worth of this category through August, not including typewriter imports. In August alone these imports reached almost $65 million.

However, most sources close to the figures said computer-related equipment accounted for only a small part of these imports, with most estimates running around 10% of the total.

An earlier Commerce Department report indicated, for example, that U.S. exports of computer equipment were set at $796 million for the first six months of the year while imports were put at $64 million, giving a plus figure of $732 million for trade in computer equipment.

That study also showed U.S. exports of computer-related equipment were running 20% ahead of the previous year, while the imports from abroad were almost 40% behind the rate of exports a year earlier.

Through August the U.S. had exported equipment valued at $597.6 million to countries that are members of the Organization for Economic Cooperation and Development, primarily a European organization.

IBM Receives Teale DP Center Contract

SACRAMENTO, Calif. – The state has awarded a $19.9 million two-year contract to IBM without competitive bidding for two 370/165s and conversion work at the Stephen P. Teale consolidated data center.

Barring a last-minute hitch, the negotiated contract was to have been signed late last week. The 165s are scheduled to be replaced by 168s later in the year.

The long-disputed contract did not have clear sailing even after the award was finally made since State Auditor General Harvey M. Rose recommended against the action.

The recommendation could lead to further delays in the contract.

Contracts were also awarded to Data 100 Corp. for $700,000 for satellite data processors, and to Boeing Computer Services for $250,000 for training employees to use the system.

Rose, a legislative employee, said the state's business and transportation agency did not conduct "valid negotiations" with Univac whose latest proposal Rose said was at least $15 million less than IBM's over a 58-month period.

Sources of 3d-Party Service Dwindling

NEWTON, Mass. – Third-party maintenance is becoming harder to procure, with Honeywell's decision to withdraw from the field and GTE Information System's announcement that it is "restricting its marketing effort, no longer aggressively pursuing new business."

A Honeywell spokesman said the company's Field Engineering Division will continue to perform service for current subscribers "until a mutually agreeable time."

About 20 small terminal and peripherals firms have contracted with Honeywell for maintenance, a source said.

GTE Information Systems Service Co. will continue in the third-party maintenance field, but is not expanding its efforts, as the "unit is fully servicing present customers" and is "very busy" with its current work load of third-party customers and GTE Information Systems units.

Gerry Stronach, director of marketing services for Sorbus, Inc., a third-party maintenance firm, said Sorbus' competition stems increasingly from the "make or buy" decision of a potential customer as alternative third-party sources dwindle.

GA May Market Business Unit With Service Bureaus

By Vic Farmer
Of the CW Staff

ANAHEIM, Calif. – General Automation (GA) will soon announce its mini-based business system and probably will use independent service bureaus as distributors and customer liaison with end users.

Based around the SPC-16 minicomputer, the system will have a typical configuration of a fixed and interchangeable disk, up to four keyboard-type CRT terminals, Centronic printer options, a new multitasking operating system. topped off with communications capability to IBM 360/370 systems, according to company sources.

But the real news is how GA plans to distribute, market and support the systems for the end user. Recently GA surveyed several hundred service bureaus and got a favorable response to the proposed distribution technique of using small-360/30-and-up-based service bureaus to sell, service, design the system software, implement the applications and perform education and guidance for the end user.

By limiting sales through distribution by service bureaus, GA expects to create a symbiotic relationship.

Mini FM?

As a small service bureau user who is approaching about $1,000/mo usage begins to look for and want his own computer center, the service bureau will be able to step in and provide this user with a packaged system for all his DP needs – almost to the extent of a "mini facility management contract."

The logic of this plan is that the service bureau will retain these customers – in a limited way – and yet the users will have the economies and flexibilities of their own center.

The user will not have to face the trauma of setting up his system alone, and as the service bureau is already familiar with the client's applications, implementation will be easier, a GA spokesman said.

GA presently is planning to set up a software pool in which all software developed for the new units will be further checked out and mutually available to other users through service bureaus.

The system will most likely offer a commercially oriented Fortran with Cobol-like I/O commands.

As the user's needs grow, he will be able to tie into the service bureau for additional DP power.

GA expects to develop another SPC-16 system to act as concentrator front ends to 360/370 CPUs for networks of these systems.

In other areas, GA is working on real-time capability for its GA 1830, an IBM 1130 replacement.

GA also expects to start shipping SPC-16-equivalent minicomputers using Silicon on sapphire circuit chip technology, announced in its eight-bit minicomputer on a chip (see Page 26).

STC Aims to Boost OEM Dealings

By Molly Upton
Of the CW Staff

NEWTON, Mass. – Storage Technology Corp. is taking aim at a new end-user market, increasing its distributorship network abroad and is seeking OEM business here in the states, Philip A. Ingalls, national OEM sales manager, said in a recent interview.

Currently, STC's only OEM customer is Compagnie Internationale pour l'Informatique, to which it ships models 3450 and 3470 drives and control units for installation on Iris 50s and 60s, machines which are basically of Sigma architecture.

Five months ago STC had two distributors, Electromark Corp. in Japan and Promodata in France, which it has since purchased.

STC has added IPE in Israel, STC Canada Ltd. and CDC Ltd. in the UK.

Through an agreement with CDC Ltd., the latter promotes STC products for use on IBM machines, a market at which CDC itself is aiming.

In addition, STC has a distributor in Spain and plans to start expanding into some of the newer international markets, such as South America, Australia and Scandinavia, he said.

STC's recently announced thrust at the Univac end-user market, with the unveiling of its 3400 with a 3820 controller installed at Keydata, signals a new market area for the company.

"We expect to obtain a larger percentage share of the Univac base than IBM," Ingalls said.

He estimated STC has around 6,000 installed units at IBM sites, whereas IBM has an installed base of around 90,000 tape units.

"We expect to install about 1,200 to 1,800 units at Univac sites," he said.

He ranked STC first and Telex second in number of installed tape units at IBM sites, and Telex first, STC second in terms of the disk base.

Mirco, Membrain Sign Pact

PHOENIX – Mirco, Inc., Phoenix, and Membrain, Ltd., London, have agreed in principle to combine their software and hardware products in a joint effort to offer complete "in-house" electronic test system capability to U.S. and European customers.

Mirco produces the Flash software system, a package used to prepare programs for automated testing of printed circuit cards.

Orders & Installations

Data Resources, Inc. has installed a Burroughs B 7700 computer system to take over the company's Economic Information System. The new computer replaces a B 6700.

Dayton Power & Light Co. has installed two NCR Century 300 computers.

Wells Fargo Bank, San Francisco, has ordered a Trace microfilmer system from Recognition Equipment, Inc.

McKesson & Robbins Drug Co. has ordered 900 Model 2001 and Model 1108 order entry terminals from MSI Data Corp. to link its customers with its ordering service.

Chrysler Corp. has ordered a Burroughs B 6700 to provide in-house commercial time-sharing facilities for the company's divisions and organizations at 13 major sites.

Compu-serv Network, Inc. has installed a Decsystem-10 from Digital Equipment Corp. to expand its computing power by 25%.

IBM Now Tops UK Market Share

LONDON – IBM is Number One in the UK, surpassing International Computers Ltd. in terms of market share, according to figures released by the Department of Trade and Industry.

At the end of 1972, IBM held 38.4% of the market compared with ICL's 34.7%. Excluding government installations, IBM cornered a 46% share of the market compared with ICL's 25.9%.

The figures show ICL holds 52.8% of the central government sector, 58.9% of local government installations and 47.5% of puhlic corporations' business.

Between April 1971 and the heginning of 1973, central government orders totaled $83.9 million, of which 68% or $57.3 million went to ICL and $20.7 million to IBM, according to the Central Computer Agency.

On the average, IBM machines are valued at $674,800 while ICL units are valued at $498,870.

Of the total installed base of almost 7,000 machines valued at $2.3 billion, machines made by foreign-owned manufacturers account for 60.5% of the value. In the private sector, which includes 4,667 computers worth about $1.5 billion, the foreign-owned manufacturers supply about 73.4% of the market, the report indicated.

The report also mentioned that government support of the computer industry was less than that given by other countries. Between 1966 and 1970, the French spent $103.2 million on its national "Plan Calcul," and this is expected to reach $220.6 million for the period 1971 to 1975.

The German Government's expenditure is expected to expand dramatically to $765.6 million between 1971 and 1975, compared with $86.7 million from 1967 to 1970.

The British Government support for the industry totaled $57.1 million from 1970 through 1973, with $33 million of that going to ICL, the report found.

International Roundup

Buildings May Be Quake-Proof

Special to Computerworld

TOKYO – A plan to establish safe and earthquake-proof design of skyscrapers in Japan through the use of computers is making progress.

Kashima Building Co. plans to establish the earthquake-proof structure of skyscrapers by the "dynamic" design method, developed by Kashima and Mutoh Structural Dynamics Research Center.

With the dynamic method, a computer is used to predict the elasticity and plasticity responses of the designed buildings. Using the shock wave as input data, one can attain the final design of the building automatically by checking the degree of those responses.

At the time of the San Fernando Earthquake in 1971, the seismograph in the company's building at Los Angeles recorded its vibration. The research center did a simulation analysis of the behavior of the building on the basis of the vibration analysis program.

The calculated result of the accelerative wave-shape and the spectrum was almost identical with the actual record of the shock of the earthquake. This proved the accuracy of the analysis which reconstructs the behavior of the building during the earthquake.

The earthquake response analysis considers the vibration and pressure on a building in hypothetical settings.

Group/3 in Paris

PARIS – Group/3 has established itself in Europe with the opening of its first office here.

Though currently operating only in Paris, the initial expansion plan calls for services to be extended to all European Economic Community countries, according to Dave Ferguson of Group/3.

Group/3 Europe is offering its customers the same services as U.S. users.

Foreign Orders & Installations

Provincial Bank of Canada has installed a Honeywell Model 6080, which will be used for a variety of batch operations and to extend current on-line capabilities.

– – –

CTF-Adaps Ltd., an Australian service bureau, has ordered three Model 2050s from Honeywell to replace Model 125 systems currently installed in data centers in Sydney, Melbourne and Adelaide.

– – –

The Ministry of Treasury, Israel, has installed a 3670 system from Memorex.

F&T Industries, Ltd., Australia, has ordered a Honeywell Model 2070 for financial, inventory and production applications.

Century Research Center Corp. (CRC), a Japanese data service center, has ordered a Cyber 70 Model 74 from Control Data, to be connected to a previously installed CDC 6600 to create a dual mainframe system.

– –

Lufthansa has purchased the Operations Control System (OCS) software package from Brandon Applied Systems, Inc.

Top Manager Urged To Take Charge of DP

NEW YORK – Senior officers of corporations must make the data processing decisions and apply computer systems where they can best serve their organizations, said C.W. Spangle at a recent conference here.

Spangle, executive vice-president of Honeywell, Inc., pointed out that some $50 billion worth of computer equipment is now in operation worldwide, noting that many firms spend as much as 1% of annual sales revenues on data processing. "At Honeywell, that figure is probably closer to 2%," he commented.

Computer users today spend more money on operating equipment and developing programs than they do on hardware itself, he stated.

During the 1970-71 recession, when senior level managers were looking for ways to cut expenses, they "found excess capacity, poor utilization of computer resources and significant opportunities to make consolidations and cost reductions that were long overdue," Spangle said.

Though this realization was a hard blow for some suppliers and EDP managers at the time, Spangle termed it a "healthy and necessary transition for the computer industry as a whole."

Independents Risky, From Lender's View

CHICAGO – "The independent computer peripheral industry is not without problems and, in general, represents an above-average risk for us lenders," stated J. Hallam Dawson.

Nevertheless, Dawson said, the peripherals market "is fast-growing and forward-looking, and we would not want to bypass such markets."

Dawson, who is vice-president, Loan Division K, First National Bank of Chicago, gave examples of the independent peripheral market's characteristics.

A significant majority of the peripheral industry's output is leased rather than sold – and leased on non-full payout terms. This requires a huge amount of capital to finance leases, he noted. In addition, rulings of the Accounting Principles Board and the SEC have forced a deferral of income on these leases, "which makes P&L statements look awful during the rapid buildup of a lease base," he said.

Dawson also noted other characteristics such as rapid technological innovation with the resulting high risk of obsolescence, heavy R&D expenses, and extensive marketing and maintenance organization.

In addition, these firms also compete in an industry dominated by IBM, he said.

"We believe our industrial specialization gives us important advantages in dealing with this industry and we are active in it on a very selective basis."

PB Writes Off $37 Million

STAMFORD, Conn. – Departing from the point-of-sale (POS) field is costing Pitney Bowes (PB) $37 million, which it has written off as of Sept. 30.

This writeoff resulted from the decision to wind up operations of Pitney Bowes-Alpex, which was 64%-owned by PB.

In addition to its entire investment in Pitney Bowes-Alpex, PB wrote off certain other assets related to the POS terminal business.

These include parts and equipment produced for Pitney Bowes-Alpex, but not delivered, and inventories, deferred costs and other items connected with the manufacture and marketing of POS equipment in Europe under license from Pitney Bowes-Alpex.

Fred T. Allen, chairman of the board and president of Pitney Bowes, said the decision was based on a comprehensive reappraisal of recent developments, competitive conditions, and long-term prospects of Pitney Bowes-Alpex' POS business.

This reappraisal showed losses of Pitney Bowes-Alpex would have continued for the foreseeable future, and substantial investment for new product development and working capital would have been required before operations could have become profitable.

The company reported a third quarter loss of $35.9 million which includes a $2.1 million loss from discontinued POS terminal operations and a $37 million loss from the withdrawal from such operations.

In the 1972 period, Pitney Bowes earned nearly $3 million, or 22 cents a share.

During the nine months, Pitney Bowes lost $29.4 million, including $5.4 million from discontinued operations and the $37 million charge, compared with earnings of $9.1 million or 68 cents a share in the year-ago period.

Earnings from continuing operations increased 6% to $3.2 million, or 23 cents a share in the third quarter compared with almost $3 million or 22 cents a share, in the year-earlier period.

Earnings Reports

ADVANCED MEMORY SYSTEMS
Year Ended Sept. 30

	1973	a1972
Revenue	$31,440,000	$14,534,000
Tax Cred	42,000	186,000
Loss	196,000	429,000
3 Mo Shr	.03	.18
Revenue	8,239,000	5,532,000
Tax Cred	.....	186,000
Earnings	55,000	334,000

a-Restated to include Computer Microtechnology, Inc. for the period ended Dec. 31, 1972.

ALANTHUS
Year Ended Aug. 31

	1973	1972
Shr Ernd	$.94	$.94
Revenue	9,000,411	3,648,057
Spec Ched	184,199	133,625
Earnings	1,105,893	732,486

APPLIED MAGNETICS
Year Ended Sept. 30

	1973	1972
Shr Ernd	$.55	$.26
Revenue	49,935,027	31,764,695
Spec Chg	.....	a425,000
Earnings	2,317,289	1,090,811

a-Provision for potential loss on dispostion of a food processing plant.

PENRIL DATA COMMUNICATIONS
Year Ended July 31

	1973	1972
Revenue	$1,772,124	$1,350,970
Loss	337,192	332,668

Position Announcements

EXECUTIVE DIRECTOR - MINCIS

Minnesota Criminal Information Systems
and Regional Justice Information Systems

- Directs computer programs and policies in coordination with local units of government.
- Prepares budget, grant applications, and legislation
- Manages computer technical staff
- Desire computer systems management experience plus knowledge of criminal justice systems and appropriate degree
- Salary to $22,632 (Salary appointment dependent upon qualifications)

For Application Write: Minnesota Department of Personnel
215 State Administration Bldg.
St. Paul, Minn. 55155
Or Call: (612) 296-2616

SYSTEMS PROGRAMMER

UNIVAC 1108/EXEC 8

We are one of the largest independent peripheral equipment manufacturers in two major product areas. We are located in the Southern Metro Los Angeles area. Our rapid growth and expanding product line has opened new opportunities for systems programmers. These positions are based at our Corporate Headquarters.

The following experience will be necessary to qualify for this position:

- Extensive experience in Exec 8 operating systems on UNIVAC 1108
- Operating systems experience on UNIVAC 400 Series computers desirable
- Assembly language experience on UNIVAC computers
- Experience in programming for mass storage peripherals
- Experience in working with customers
- Work well independently
- Bachelor's Degree preferred
- Some travel required.

This is an outstanding opportunity to continue your diversified experience while working with a young, dynamic company.

Send resume and salary history
in confidence to: CW Box 3999
797 Washington Street
Newton, Mass. 02160
An Equal Opportunity Employer

Programming Openings at Colt Firearms

At the Firearms Division — Colt Industries — we're currently experiencing an increased demand for our famous line of sporting and law enforcement products. Right now we're looking for EDP professionals who can become part of a team that is making Electronic Data Processing an integral part of our division's growth.

An exciting and rewarding future awaits candidates who possess COBOL programming and analytical experience utilizing sophisticated 3rd generation equipment in manufacturing, financial and administrative applications within an industrial environment. Exposure to assembler language and a Bachelor's Degree are important.

Good starting salaries are just part of the professional career package offered by Colt Firearms.

If this sounds like the kind of Data Processing career you've been looking for, send your resume with salary requirements to M. N. Strom.

Colt Industries
Firearms Division
150 Huyshope Avenue, Hartford Conn. 06102
An Equal Opportunity Employer

EDP Software Professionals

For an expanding personal future, turn your creativity to new systems development at Xerox

As a company that thrives because it responds so well to the informational needs of business, Xerox is sharply aware of its own continuing requirement to keep in-house information services streamlined and upgraded. Faced with a fast-paced, ever changing business scene, we are constantly seeking new ideas, new ways to achieve higher levels of systems efficiency. If you can contribute to the improvement of software technology, this is an opportunity to utilize all your innovative ability and technical skills in a challenging, dynamic and professionally rewarding environment.

PROGRAMMING ANALYSTS & SPECIALISTS

Applicants should have a minimum of four years experience working on third and fourth generation computing equipment. Openings currently exist in the following areas:

Large Scale On-Line Systems Development
Requires experience in multi-programmed operating system environment, perferably using virtual storage.

Testing and Integration
Requires experience in large operating systems that use complex data base/data communications systems in a multi-programmed or time shared environment. Experience in virtual storage systems is highly desirable.

Host Software
Operating system/virtual storage experience very desirable coupled with internal knowledge in one or more of the following areas: job management, job scheduling, data communications, or data base mangement. This experience will have been applied in a development or operations' support activity.

SYSTEMS CONSULTANTS & PROGRAMMERS

Applicants should have significant experience in Data Management of large scale computer systems. This will have been utilized in Information Storage and Retrieval Techniques (coding and search question development), abstraction, and in utilizing commercial retrieval packages.

You'll work in our brand new facilities in suburban Rochester, N.Y. where you'll play a significant role in designing and implementing advanced, highly sophisticated computer network systems. Salaries are most attractive. And an outstanding benefits program includes liberal relocation allowances.

Please forward detailed resumes, including salary requirements, in confidence to Mr. Kyron P. McCarthy, Xerox Corporation, Dept. Mz-86-N3, P.O. Box 9605, Rochester, New York 14604.

XEROX

An Equal Opportunity Employer (Male/Female)

Customer Service Engineers

I have openings for over (100) "C.E." These positions are available in the major cities throughout the U.S. and Canada. Customer Engineers with experience on small or large scale computers, peripheral equipment, etc. You'll need a minimum of (2) years of experience.

Jr. CE .....to$1100 mt.
CE ..... to $1300 mt.
Sr. CE ..... to $1500 mt.
Tech Spec. .....to$Plus mt.
Field Mgrs. ..... Sal Neg. mt.
Systems Analyst .. to $1500 mt.
Salesmen ..... Sal. Plus

Bill Gill
AND ASSOCIATES
5724 W. Diversey Av.
Chicago, Ill. 60639
(312) 622-7711

Computerworld Sales Offices

Vice President—Marketing: *Neal Wilder.* **Sales Administrator:** *Dottie Travis.* Computerworld, 797 Washington St., Newton, Mass. 02160. Tel: (617) 965-5800.

Northern Regional Manager: *Robert Ziegel.* **Account Manager:** *Mike Burman.* Computerworld, 797 Washington St., Newton, Mass. 02160. Tel: (617) 965-5800.

Eastern Regional Manager: *Donald E. Fagan.* **Account Manager:** *Frank Gallo.* Computerworld, Suite 1511, 225 W. 34th St., New York, N.Y. 10001. Tel: (212) 594-5644.

Los Angeles Area: *Bob Byrne.* Robert Byrne & Assoc., 1541 Westwood Blvd., Los Angeles, Calif. 90024. Tel: (213) 477-4208.

San Francisco Area: *Bill Healey.* Thompson/Healey Assoc., 1111 Hearst Bldg., San Francisco, Calif. 94103. Tel: (415) 362-8547.

Japan: *Ken Suzuki.* General Manager, Dempa/Computerworld, 1-11-15 Higashi Gotanda, Shinagawa-ku, Tokyo 141.

POSITION ANNOUNCEMENTS | POSITION ANNOUNCEMENTS | POSITION ANNOUNCEMENTS | POSITION ANNOUNCEMENTS | BUY SELL SWAP

ANNOUNCEMENT

Programmers

A New York City consulting firm is seeking programmers with heavy experience in OS COBOL and FORTRAN. Send resume, experience, and salary to:

CW Box 3998
797 Washington Street
Newton, Mass. 02160

SYSTEMS PROGRAMMER
BURROUGHS

Milwaukee, Wisconsin, based installation is looking for strong software specialist for our large on-line data communications systems. Must have B3500 or B4700 COBOL experience; communications and data management exp. helpful. 200 plus terminal network including TC 500, TC 3500 and Incoterm CRT's.
Midland Data Processing is a rapidly expanding service center providing on-line data processing services. All replies confidential. Send resume or call me, Don Kamin, collect at 1-414-278-6013.

MIDLAND
DATA PROCESSING
201 West Wisconsin Ave.
Milwaukee, Wisconsin 53203

SENIOR PROGRAMMER/ANALYST
For Software Development

To participate in development and support of an on-line programming system.

- Strong in BAL, OS JCL, OS utilities, basic access methods.
- Familiarity with remote terminal devices and their use in such systems as TSO, CRJE or CRBE.
- Ability to work with customers; light travel required.

Send resume to:
Personnel Director - SPD
Applied Data Research Corp.
Route 206 Center
Princeton, N.J. 08540
An equal opportunity employer.

CAN YOU MANAGE SALESMEN?

Earn in upper twenties while reaching your goals. 2-5 yrs in time-sharing or related fields, plus successful sales track record required. Profit sharing & stock options. After establishing credibility with our client, you will move into management. Base salary $17,000 + lucrative incentive plan. Free paid. (agency)

DUNHILL
1 E. 44 St. NYC 10017
(212) 986-0100

Itty Bitty Monopoly
Service Systems Sales

We're specialists in ibm "Customer Engineer" Extractions.

Bill Gill and Associates
Salary $1300-$1800/month
5724 W. Diversey Av.
Chicago, Ill. 60639
(312) 622-7711

UNIQUE GROWTH OPPORTUNITY

For progressive commercial programmers to expand to their horizons! Reqd.; COBOL-DOS/OS-360/30 or larger-2 to 5 years experience.

The firm; an exciting growing young company with a rare blend of promotion from within, merit reviews, and financial stability.

To 15K

Contact Howard Payne
(202) 296-1616
or send resume to
HWP ABILITY SEARCH, INC.
1629 K St. N.W.
Suite 201
Washington, D.C. 20006

PROCESS COMPUTER SALES ENGINEERS

Philadelphia, Detroit, L.A., Chicago, San Francisco. Requires at least 3 years experience in sales, applications, or implementation and start-up of process computer systems. These systems are used for process management and control of chemical plants, refineries, steel mills, pulp and paper mills, food plants and other continuous process industries. Successful candidates should have a BS degree in engineering and a thorough knowledge of computers and how they are applied for control and data acquisition purposes in the above industries. Sales experience is desired but not absolutely necessary. 25K plus Auto and Expense Account.

CW Box 400t
797 Washington Street
Newton, Mass. 02160

COMPUTER PROFESSIONALS

Our client, a listed, expanding New York State firm, has immediate openings for the following personnel:

Systems Specialist 19k
3-5 yrs. major mfg. systems exp. with excellent communication skills. BS-MBA preferred.

Systems Programmer . . .t8k
Successful candidate will have responsibility for generating and maintaining telecommunication systems. 1-3 yrs. 370/DOS exp.

Systems/Analyst 15k
Excellent opp. to advance to Project Leader. 1-2 yrs. general financial bus. systems with good programming background.

Programmer 13k
One year of bus. programming exp. required for this new position. If your first position was a mistake, this could be the Co. you want.

Send resume or call:
Career Advisors
125 Wolf Road—Albany, N.Y. 12205
(518)458-1810
Our client companies assume all fees.

RESEARCH ASSOCIATE IN EDUCATIONAL COMPUTING UNIVERSITY COMPUTING CENTER

Major university with modern Computer Center seeks Research Associate in Educational Computing to fill new position. Candidates must have at least two years experience with the development, implementation and management of Computer Assisted Instruction. The position requires at least a Masters degree in Computer Science or a closely related discipline. Qualifications for academic duties are highly desirable. Responsibilities include management of Computer Aided Instruction program and direct supervision of small technical staff with possible extension to some teaching of standard computer programming courses.

Colorado State University is an equal opportunity employer.

Qualified applicants should forward resumes and request that appropriate references (3) be submitted for consideration prior to December 28, 1973 to:

Ronald J. Carlson
University Computer Center
Colorado State University
Fort Collins, Colo. 80521

Buy Sell Swap

360/370
BUY-SELL-LEASE
Call or Write:
George S. McLaughlin
Associates, Inc.
480 Morris Avenue
Summit, N.J. 07901
(201) 273-5700

data sales co.
BUY • SELL • LEASE
IBM 360/370
SYSTEM 3 MEMORY
Call or Write
13200 Penn. Ave. So.
Burnsville, Minn. 55337
(612) 890-8838

1401

Several Card, Tape and Disk Systems in Inventory

CMI Corporation
16225 E. Warren Ave.
Detroit, Michigan 48224
(313) 889-0440

CMI Company
408 Bartlet Building
76 University Ave. W.
Windsor, Ontario N9A 5N7
(519) 258-8910

FOR SALE
8—Flexowriters 2301 with 2314
Select/Data units, 2317 Manual Data Selectors and Desks
2—Flexowriters SPS with Selectdata STRAD and Stands All units under Singer maintenance and available immediately.
Call W. Askins
EDGCOMB STEEL CO.
Philadelphia, Pa.
(215) 632-1000

FOR IMMEDIATE LEASE
360/65
ONE YEAR
TWO CHANNELS
256K(Plus)
1052
For Details Call
Or Write:
Mr. W. Buchwald
Aldens, Inc.
5000 W. Roosevelt Rd.
Chicago, Ill. 60607
(312) 854-3994

ACS
FOR SALE
UNIT RECORD
READY TO GO

Refurbished	On IBM M/C
2-083s	2-514 Mdls
3-548s	2-552s

403 A1 w/CAD unit
AVAIL SPRING '74
H-200 16K 4-tape System
AND AVAIL NOW
2-1401 16K Tape System
Refurbished-Delivered and Installed - All At One Low Price
1620 60K SYSTEM
AVAIL NOW
CHEAP! CHEAP! CHEAP!
ACS Equipment Corporation
8928 Spring Branch Drive
Houston, Tx 77055
(713) 461-1333

find out *if digital is your kind of place*

At Digital it's the way we're put together that makes us move.

An unstructured environment, the give and take between people, an attitude that encourages technical excellence and the freedom to achieve it.

We've got a good thing going.

Write us. Digital is your kind of place.

FIELD SERVICE ENGINEERS

This is an outstanding opportunity to be part of Digital's internal team, working directly on Digital's internal computers and in direct communication with the people who design and build the equipment. No traveling, just the beauty of working in the heart of challenging large computer maintenance, installation, development and evaluation activities. If you have 2-3 years large computer system hardware expertise with a strong working knowledge of processors, memories and peripherals, i.e., DECsystems10, IBM 360/370, Spectra 70, CDC 6600/7600, or any comparable machine, investigate what we have to offer in training, opportunity and benefits.

PRODUCT SUPPORT ENGINEERS

Two musts: 3-5 years of maintenance experience on digital central processors and peripheral equipment and a desire to travel. You will be responsible for product support on a regional or US basis. You may also assist in engineering analysis and suitability of product design and final acceptance criteria of particular products.

HARDWARE INSTRUCTORS

We need dynamic and innovative individuals as instructors teaching computer hardware systems. The courses are taught in our newly completed educational services center at our corporate headquarters in Maynard, Massachusetts. Applicants should have an interest in using "state-of-the-art" teaching techniques, i.e., IPI, AV, PSI, etc. Field service experience and digital experience and digital computer repair and at least one year teaching experience preferred.

LARGE COMPUTER SYSTEMS SALES

You are the key in a highly motivated Digital sales team, developing, managing, and servicing new and existing accounts for our successful large computer system, DECsystem 10. You will present this computer and its peripherals to the computation, scientific, educational, and commercial markets. You must have a technical degree, preferably with additional work toward an advanced degree in business, experience in interactive computing, established sales ability with at least 2 years experience, and time-sharing, batch processing, and real-time applications in scientific, educational, and administrative environments.

Please direct your resume in strictest confidence to Ken Trend, Professional Personnel, Digital Equipment Corporation, 162 Main Street, Maynard, Mass. 01754

digital
digital equipment corporation

The above positions are open for application to men and women regardless of race, national origin, age, religion or creed

BUY SELL SWAP | BUY SELL SWAP | BUY SELL SWAP | BUY SELL SWAP | BUY SELL SWAP

For Sale

2 — Univac 1050 III's

System A

Available December 31, 1973
III Processor/Console
VI-C Tape Drives (6)
Printer
24K Memory

System - B

Available January 31, 1974
III
Processor/Console/Typewriter
VI-C
Tape Drives (4) with Synchronizer
90 Column-Reader & Punch
Printer
24K Memory

Contact: Mr. A. Panariello
General Development Corporation
1111 South Bayshore Drive
Miami, Fla. 33131
(305) 350-1211

Before You Buy —Lease — Sell — 360 • 370 • 1401 • IBM Unit Record Equip.
Please Call or Write
COMPUTER CLEARING CORPORATION
2600 Arroyo, Suite 124
Dallas, Texas 75219
Dallas, (214) 528-5087
Chicago, (312) 642-5103
"We guarantee delivery at a fair market price."
— George Jachimiec, President —

Lease Buy Sell
DEAL WITH PROFESSIONALS IN PLACEMENT OF PRE-OWNED EQUIPMENT
360
"The Nations Largest Wholesale Dealer"
COMPUTER WHOLESALE CORP.
Suite 441-447
National Bank of Commerce
New Orleans, La. 70112
(504) 581-7741

UNIVAC 1004/1005

- Buy/Sell/Lease
- Refurbish/Overhaul/Maintain
- System Upgrades
- 90 to 80 Col. Conversions
- 80/90 Col. Parts Available

Contact M.A. Jarrett

MAINTECH INC.

1133 Ave. of the Americas
New York, N.Y. 10036
(212) 586-2823

FOR SALE OR LEASE
IBM 1401 SYSTEMS
with or without
Tape Drives & Disks
Savings in thousands
D.P. Equipment Marketing Corp.
260 W. Broadway, N.Y. N.Y.
CALL (212) 925-7737 Ext. 1

BUY SELL LEASE

1410	7074	729's
360/50	1620	360/40
360/20 & 370's		HP 2116C

Systems and Components
Minis & Teletypes

EBM 220 HARVEST AVE.
STATEN IS., N.Y. 10310
(212) 273-3636

LDI

SPECIALISTS IN 370 CORE 3360/003 3360/005

BUY • SELL TRADE • LEASE ANY EDP EQUIPMENT

Leasing Dynamics Inc.
3101 Euclid Ave.
Cleveland, Ohio
216-687-0100

WE PURCHASE 360/20/30
WE LEASE & SELL 360/20/30
THIS WEEK 360/20
SPECIALS: Bi-Synch

For Sale
029, 059, 083, 084, 026, 557
All 360/20 Systems

SIMPLICITY COMPUTER CORP.
257 W. 39th Street
New York, N.Y. 10018
(212) 695-3010

PROFESSIONAL COMPUTER DEALERS IN THE WEST

SMI

SYSTEMS MARKETING, INC.
3930 E. CAMELBACK ROAD
SUITE 202
PHOENIX, ARIZONA 85018
Robert R. Russell
(602) 956-8470
John Detrick
(714) 558-9501

MAGNETIC TAPE SALE

1600 BPI	2400'	$4.47
1600 BPI	1200'	$3.97

(3200 FCI) (9 track tested)

800 BPI	2400'	$3.47
800 BPI	1200'	$2.97

thin-line canisters
LIKE NEW
BACK UP TAPE USED!
RECERTIFIED
TROUBLE FREE
WITH PRINT OUT
GUARANTEED
F.O.B. Alexandria, Virginia
Call Miss Joan or Miss Penny
(703) 354-5100 (703) 354-5101
Precision Methods Inc.
5390 Cherokee Avenue
Atlantic Research Building
Alexandria, Virginia 22312

WANTED

TELETYPE® EQUIPMENT
New • Used • Parts
— ALSO —
• Data Terminals • Peripherals
• Mini-Computers • Modems

Contact us for data terminal sales, service, supplies and rentals.

TERMINAL SYSTEMS INC
11300 Hartland St.
N. Hollywood, Calif. 91605
213-769-6772 TWX 910-499-2675

FOR SALE OR LEASE

024-$350; 026-$1300; 056-$250; 077-$550; 082-$900; 083-$2600; 085-$1500; 088-$4000; 402-$1300; 403-$1400; 407-$3000; 514-$1250; 519-$1500; 548-$2300; 552-$1400; 557-$3700; 602-$400; 2311 (1) $4000; 729(5)-$2500; 729(6)-$2500; 1448-$1000; 1401 system-$14,000.

THOMAS COMPUTER CORP.
600 N. McClurg Court
Suite 3807
Chicago, Ill. 60611
(312) 944-1401

WANTED

1005 Tape System

FOR SALE

082's, 519's, 548's, 557's

UNIT RECORD SERVICE
84 Cummings Park
Woburn, Mass.
Call (617) 935-6340

HONEYWELL 2050A

FOR SALE OR LEASE

H-2051-C	CPU (131K)
275-2	Disk
293F-3(2)	Mag Tape
204F-3(6)	Mag Tape
214-2(1)	Card I/O
220-3(1)	Console
222-4(2)	Printer (950 LPM)

Contact:
William G. McDonald
Consolidated Information Co.
1043 Stierlin Road
Mountain View, California

CORE MEMORY REPAIR

- Cleaning
- Core replacement
- Restringing
- Factory level testing

(213) 889-6031

VALLEY COMPUTER
A Division of TYMSHARE, INC.

31355 W. Agoura Road
Westlake Village, Ca. 91361

UNIT RECORD EQUIPMENT SPECIALIST

FOR SALE
All Models EAM rebuilt, refurbished, for immediate delivery on IBM Maintenance.

WANT TO PURCHASE
Key punches, Verifiers, Sorters, Collators, Peripheral Equipment, etc.

Contact: Jordan Halper
HALPER COMPUTER SALES CO.
15 West 44th Street
New York, N.Y. 10036
(212) 869-0599

IBM 1401 SYSTEMS

Configured to Your Requirements
Card, Tape, and Disk

IBM 1403 PRINTERS

For Sale or Lease
Immediate Delivery

IBM 729

Magnetic Tape Units
Models II, IV, V and VI

THE HALSEY CORPORATION
1367 Central Avenue
Middletwon, Ohio 45042
(513) 424-1697
Member Computer Dealers Assoc.

FOR SALE

(1) P.D.S. 1020 Computer, Serial No. 118, Part No. 10308, with the following accessories: 2,048 additional words of memory, IBM wide carriage typewriter. Originally purchased January 1966.
Purchase price $24,700.00
Needs minor adjustments. Reason for selling, finalcial difficulties. No reasonable offer refused.

KURCH-HOUSLEY AND ASSOCIATES, INC.
McNeilly Professional Bldg.
405 McNeilly Road
Pittsburgh, Pa. 15226

FOR SALE OR LEASE

CONTROL DATA/ DATA DISPLAY

280 DIGITAL DATA RECORDER AND DISPLAY SYSTEM

Includes: 284 Microfilm, Recorder, #3898 Display, Controller, #282 CRT with options and #283 Hardcopy Recorder.

Call: D.J. Mundrick
or
Write: 300 E. Joppa Road
Baltimore, Maryland 21204
AC (301) 823-1600

UNIT RECORD
1401, 1440
1620
360/20, 360/30

Hundreds of Satisfied Users

CALL US LAST, BUT CALL US!

Canada
408 Bartlett Bldg.
76 University Ave. West
Windsor, Ontario
(519) 258-8910

USA
16225 East Warren Ave.
Detroit, Michigan
48224
(313) 889-0440

CMI CORP.

INPUT MANAGEMENT

Large volume jobs processed QUICKLY and ECONOMICALLY

UTILIZING:
*KEY-TO-DISC — Any density or track mag. tape.

FOR QUALITY DATA CONVERSION CALL:
(616) 375-5300

MANATRON
'THE INPUT PEOPLE'

2970 South 9th St.
Kalamazoo, Mich. 49009

401 Commerce Bldg.
Detroit, Mich. 48226

SYSTEM 360/370 | dearborn computer leasing corporation

A business relationship you can't afford to be without . . .

- Lease Terms to Fit Your Needs • Field Engineering Support
- Systems Engineering Support • Well Trained Marketing Staff
- Buy and Sell-360s • Subleasing
- Member, Computer Lessors Association

Dearborn Computer Leasing Corporation
a subsidiary of Dearborn-Storm
4849 North Scott Street / Schiller Park, Illinois 60176 Area 312 / 671-4410

---

buy·lease·sell

370 & 360 EQUIPMENT

Branch Offices:
HARTFORD, CONN.
PITTSBURGH, PA.
WASHINGTON, D.C.

CIS PRESENTS ECONOMY IN IBM HARDWARE, and backs it up with an established reputation for service, dependability and a penchant for detail. No loose ends. Personal contact with experience gathered in the field combine to bring you maximum economy and razor sharp performance. Talk to a CIS man now. You know he'll deliver!

CIS
CONTINENTAL INFORMATION SYSTEMS CORPORATION

Contact:
B.J. Mahoney
D.R. Tebo
J.L. Delaney

MIDTOWN PLAZA, SYRACUSE, NEW YORK 13210 (315) 474-5776

FOR LEASE OR SALE

360-40-G-22580 with features	2401-2-9 Track with features
3237 6980	7160
4427 6981	360-20-8K System
4457 7520	2560
4460 7920	2203
4462	2501
1052-7	Available Mar. 74
Available Nov. 1973	
1316-DISK PACKS-$20.00	Lease — $4.00 Month
2315-DISK PACKS-$35.00	Lease — $5.00 Month
2316-DISK PACKS-$75.00	Lease — $7.50 Month

WANTED

360 Systems	All Types of
I/O Sets	Card Equipment
029-B22	1401 Systems
029-C22	Tapes & Controllers

DATA AUTOMATION SERVICES, INC.

7790 N.W. 7th Ave.
Miami, Fla. 33150
305-693-3912

Home Office
4858 Cash Rd.
Dallas, Tex. 75247
214-637-6570

318 W. 28th St.
Los Angeles, Ca. 90007
213-747-0587

BUY SELL SWAP | BUY SELL SWAP | BUY SELL SWAP | BUY SELL SWAP | BUY SELL SWAP

370/155

1 Megabyte
6 Disk Drives
12 1600 BPI Drives
1 Dual Density
1-7Track Drive
4 On-Line Printers
OS (21.7) • MVT/CICS
ANS COBOL • PL/1
RPG • ALC • FORTRAN
G&H

PRINTER TIME

4 On-Line
10 Off-Line
Total Print Capacity
1 Million Lines/hour
Fast Turnaround
Excellent Rates

R.L. Polk & Co.
Computer Time Sales
Ron Murray
(313) 292-3200

For Sale or Lease
Univac 1108 CPU

Mass Storage
and Communication
Subsystems

Please write:
CW Box 3992
797 Washington Street
Newton, Mass. 02160

SALE/LEASE
IBM 360/44-128K
Available-
March 15, 1974

Forsythe/McArthur Associates, Inc.
919 N. Michigan Ave.
Chicago, Ill. 60611
(312)943-3770 TLX25-5161

SALE/LEASE
360/20's

D2-16K, 1442-5, 2501 A-1
1403-2, D2-16K, 2203 A1,
2560 A1, (2) 2311-11, 2415-1

SPECIAL SALE

360/30's, 40's, 50's, with I/O sets. 3360-3 core units, 370-145's 155's 1401 C3 1402-1, 1403-2

WE WANT TO BUY

All model 360/20's, 360/30's 40's, 50's, and 65's. 370's and System 3's. All peripherals and unit record equipment.

360/370 & SYSTEM 3

FINANCING AVAILABLE

PHILADELPHIA (215) 568-6620
NEW YORK (516) 487-9812

505 Northern Blvd.
Great Neck, N.Y. 11021

CROSS COMPUTER CORPORATION

BUY-SELL-LEASE
360/20

360
30/40/50
65

370
145/155

1130

ECONOCOM

Division of Cook Industries, Inc.
2185 Democrat Road – P.O. Box 16902
Memphis, Tennessee 38116
901-396-8890 or 901-396-8600

BEFORE YOU BUY — BEFORE YOU SELL
GO GREYHOUND

WANTED
All 370's 360/65's and 360/50's

FOR SALE
1012-1 Tape Punch
2030F, 2821-1, 2540-1, 1403-N1, and Tape or Disk to your specifications
Immediate Delivery

A member of the Computer Lessors Association

CALL OR WRITE: Director — Equipment Sales
Greyhound Computer Corporation
Greyhound Towers
Phoenix, Arizona 85077 Phone 602) 248-5972

FOR SALE OR LEASE

IBM 360/50
MODEL G 128K SER. 12072
• 3 SELECTOR CHANNELS
• 1052 AOAPTER
• 1052 CONSOLE TYPEWRITER

IBM 360/50
MODEL HG 384K SER. 12091
• 3 SELECTOR CHANNELS
• 1052 AOAPTER

IBM 2803
TAPE CONTROLLER SER. 31801
• FOUR 2401-2 TAPE UNITS

• ALL EQUIPMENT USED • AVAILABLE AFTER DECEMBER 1, 1973
• FOR FURTHER INFORMATION, CONTACT L. W. KINDERMAN, ORESSER INDUSTRIES, INC., ORESSER COMPUTER SERVICES DIVISION, PITTSBURGH, PA., 15220 • TELEPHONE (412) 921-7100

BUY • SELL • LEASE
IBM 360/370

IPS is the oldest dealer in used IBM equipment in the world. We have an experienced staff, hundreds of satisfied users, and a stable financial base. IPS carries a multi-million dollar inventory and is always prepared to buy or sell 360 or 370 equipment. On any 360 or 370 purchase, sale, or lease, call or write IPS for a realistic and competitive quote.

IPS

IPS COMPUTER MARKETING CORP.
467 Sylvan Avenue,
Englewood Cliffs,
New Jersey 07632
(201) 871-4200,
TWX (710) 991-9677

COMDISCO

Biggest dealer in the world.
A good investment any way you look at it.

We're the one investors look to as the industry spokesman DP managers trust. The one who grew 225% a year since we started in business. The one whose yearly net earnings climbed from $14,000 to over $1 million in 4 years. Why? We're a dealer, *not* a leasing company. Over 90% of our business is buying, selling, trading. We'll sell you a pre-owned IBM computer at 40% less and guarantee to buy it back. We're the one who's never had to back out of a single commitment or delivery date because of the huge inventory we maintain. The one who arranges transportation, insurance, installation as well. Yes, you might say we're a good investment. Specially if you looked at our tell-all annual report. Want a copy? Write us. **For instant action call collect: 312-297-3640 (TWX 910-233-2478) Comdisco, Inc., 2200 East Devon Avenue, Des Plaines, Illinois 60018.**

Immediately Available from Comdisco:

370 SYSTEMS: 370/135 (GD) & 370/155 (J) • **360 SYSTEMS:** 360/65 (H, I, IH, J); 360/50's (128K to 512K); 360/40's (64K to 256K); 360/30's (1.5 or 2.0 MIC.); 360/20 8K SYSTEM • **CORES:** 2365-2 or 13 (65 CORE); 3360-3 (155 CORE); 3360-5 (165 CORE) • **ALSO:** 2420-7's (TAPE DRIVE); 2314-1's (WITH OR WITHOUT 2-CHANNEL SWITCH.)

BUY SELL SWAP | BUY SELL SWAP | BUY SELL SWAP | BUY SELL SWAP | BUY SELL SWAP

Sale or Lease
CDC 3400

32K Memory
501 Printer, 405 Reader
4-604 Tape Dr., 2-854
Disk Dr. 415 Punch,
3401 Console, Spare Parts
And Software Included

(318) 233-5010

FOR LEASE
360/50 512K

3 SEL 1052 1410/7010

Original owner placing on the market for Dec/Jan delivery.

Looking for a 3 year lease with options to purchase — will consider shorter terms.

CW BOX 3990
797 WASHINGTON STREET
NEWTON, MASS. 02160

THE 1ST SECOND SOURCE IN DIGITAL EQUIPMENT

IBM 523 Card Punch
Data Products Line Printers
(Interfaced to most Main Frames)
Ampex TM-16 Tape Drive
(IBM Interchangeable)
Potter SC-1080 Tape Drives
Xerox R.A.D.'s
Memorex 660 Disc Drives
Data Products SP-120 Card Punch

All above equipment completely refurbished and warranteed.

Quelex Data Systems, Inc.
8740 Shirley Ave.
Northridge, CA 91324
Telephone No. (213) 349-9711
TWX No. (910) 493-1243

Contact: "Dynamic Duo"
C. Fusco/L. Levinson

Current Inventory
SALE

All this Unit Record Equipment in stock and ready to ship at money saving sale or lease prices.

RARELY OFFERED
046, 047, 029, 059, 407, A3, 548, 557, 087, 088
MARK SENSE 519
OTHER FINE MODELS
024, 026, 056, 077, 085, 402, 403, 407, 514, 519, 523, 552, 602, 604, 521, 826

••• D.P. Equipment
••• Marketing Corp.
260 W. Broadway, N.Y. N.Y.
(212) 925-7737 Ext. 1

OPEN TO BUY
MINIS

DEC-HONEYWELL
Data General
HP-SEL-IBM
Varian Interdata
etc . . .
Available Cash
Large Lots Preferred

(617)261-1100

AMERICAN USED COMPUTER CORP.
P.O. Box 68, Kenmore Station
Boston, Mass. 02215
TWX: 710-321-6388
member
COMPUTER DEALERS ASSOCIATION

New! 1401 SIMULATOR "SIM14" T.M.
NOW AVAILABLE FOR 360-50-65 USERS

- EXECUTES UNOER BOTH OOS & OS
- SUPPORTS 1401 UNIT RECORD, TAPE AND DISC DEVICES
- JCL AND FILE COMPATIBLE WITH CS30-40
- SELF RELOCATING FOR MULTIPLE PARTITION EXECUTION
- THRUPUT SPEEDS EQUAL TO CS40
- PROVEN PRODUCT BY CUSTOMER USE
- TAKE ADVANTAGE OF 360-50-65 LEASE PRICES WITHOUT HAVING TO REPROGRAM **ANY** 1401 PROGRAMS

Call or Write
DEARBORN COMPUTER LEASING CORPORATION
Subsidiary of Dearborn-Storm Corporation
4849 No. SCOTT, SCHILLER PARK, ILLINOIS 60176 312 671-4410

BUY...SELL...LEASE
IBM 360/370

THE COMPUTER EXCHANGE INC.

In the West: 8105 Edgewater Dr., Oakland, CA 94621, (415) 638-9005.
In the East: 11 Grace Ave., Great Neck, N.Y. 11021, (516) 466-6500.

WE WANT TO LEASE OR PURCHASE
NCR CENTURY EQUIPMENT

1. Paper tape reader model 660
2. Tape encoder w/paper tape model 736-501
3. Tape/disk controller model 622

Prof. Data Services
Center, Inc.
P.O. Box 306
E. Longmeadow, Ma. 01028
(413) 525-4515

We Need:
1419
MOD 1

BUY SELL LEASE

FOR BETTER VALUE LOOK TO:

Available:
370/155J
360/50-512K
360/40 All Models
As a package:
2401-IV, 2402-IV, 2403-IV.

cac
COMPUTER ACQUISITIONS COMPANY
P.O. Box 80572 Atlanta, Ga. 30341 (404) 458-4425
Strathmore Office Bldg. Highway 34
Matawan, N.J. 07747 (201) 566-8924

buy • sell • lease • trade
360/370
dataservequipment inc.

Call Collect ..... 612—546-4422
Or Write ..... 400 Shelard Plaza, Suite 415
Minneapolis, Minnesota 55426

SALE OR LEASE

360 Systems, 1401 Systems
2400 Tape Drives, 2311 Disk Drives
1620 Systems, 029, 206, 059
All Types Unit Record Equip. Incl. 082, 083, 402, 407, 514, 519, 557

EQUIP. WANTED

360 Systems, 1401 Systems
Tape Drives
All Types Of
Card Equipment
029, 059, 026

SPECIAL SALE

360 (30) Sys. I,O, Set
1620 Disk Sys. 1443 Printer 2311 Disk Drives
1401-8K 729-Tapes

dpa

- DPA with offices in most major cities now offers IBM equipment completely reconditioned prior to shipment.
- Member Computer Lessors Assn.
- Call or Write

DPA Inc. 2636 Farrington St., Dallas, Texas 75107 (214) 637-0950

WANTED
BURROUGHS L SERIES
TC 500, A149, A150
NCR 31, 32, 41, 42
481-482
FRIDEN Computypers and Flexowriters
IBM 735 I/O Terminals

Call Stuart Rubenstein
I.O.A. Data Corp.
383 Lafayette St., N.Y. 10003
(212) 673-9300

360-370 marketplace
BUY • SELL • LEASE

BRANCH OFFICE:
222 E. Wisconsin Ave.
Lake Forest, Ill. 60045
(312) 295-2030

TLW COMPUTER INDUSTRIES INCORPORATED

BRANCH OFFICE:
3031 Tisch Way
Executive Suite 13
San Jose, Calif. 95128
(408) 249-0110

3570 AMERICAN DRIVE • ATLANTA, GEORGIA 30341 • 404/451-1895

HIGH TECHNOLOGY REPAIR AND REFURBISHMENT

- Core Memory Repair
- Disc and Drum Refurbishment (Clean Room)
- Module Repair
- Systems Refurbishment and Modification

Over 40 people strong - specializing in being your "1ST SECOND SOURCE" in depot-level support.

Quelex Data Systems, Inc.

8740 Shirley Ave.
Northridge, CA 91324
Telephone No. (213) 349-9711
TWX No. (910) 493-1243

Contact: "Dynamic Duo"
C. Fusco/L. Levinson

SALE/LEASE

IBM 360/40-128 or 196K
2821, 2540, 1403/N1
Available Now

Forsythe/McArthur Associates, Inc.
919 N. Michigan Ave.
Chicago, Ill. 60611
(312) 943-3770 TLX 25-5161

FOR SALE IMMEDIATE DELIVERY

UNIVAC
SPECTRA 70
70/45 System $95,000
70/35 System $67,500
Tape, Card, Disk, Printer, Video Data Terminals
418-II
1004-II & 1005-III Tape
Upper/Lower Case

9200 CARD SYSTEMS UP TO 75% OFF

IBM
360/30 CPU
360/40&50 CPUs
3360- 1,3,5 CORE
3330-1, 3830-1 Disk
2311/2841 Disk & Control
2401-5 Tapes, (Dual Density)
System 3 BI/SYNCH Feature
7094 System $38,500
1301 & 729-VI Tapes

HONEYWELL
GE 635 SYSTEM
H1200 (81K) CPU
200 Series Units
CPU, CARD, TAPE, CORE
PRINTER & DISK

115-2 SYSTEM $85,000
32K CPU, CARD I/O,
(3) DISK DRIVES and
1100 LPM Printer

CALL 617-261-1100

Send for FREE Reprints "Maintenance of Computers"

AMERICAN USED COMPUTER CORPORATION
P.O. BOX 68, KENMORE STATION, BOSTON, MASSACHUSETTS 02215 TWX: 710-321-6388
member COMPUTER DEALERS ASSOCIATION

BUY SELL SWAP | BUY SELL SWAP | BUY SELL SWAP | BUY SELL SWAP | BUY SELL SWAP

FOR SALE

IBM 1401 16K
W/5 · 729Vs
S30,000
Available Jan. 2, 1974

CONTACT
Jim Komar
(813) 585-6565
ATTRACTIVE LEASE CAN BE ARRANGED.

UNIVAC 1004

Processor, Read-punch
Boards and Wires
Use for:
Stand alone computer
Terminal
I/O Device

Rodman Industries, Inc.
P.O. Box 755
Rock Island, Ill. 61201
(309) 788-6351

For lease by owner 360/30 E or F

Available immediately with any features. I/O set and peripherals also available.

EDP RESOURCES INC.
One North Broadway
White Plains, N.Y. 10601
(914) 428-3804

IBM 2415-2

Four Tape Drives
& Control
Will Sell or Lease
Avail. Feb. 15, 1974

Computer Sales, Inc.
P.O. Box 1069
Edmond, Okla. 73034
405/348-0263
Contact-Bill Roselus

WANTED

CDC 863 Drum
CDC 6400 Memory
UNIVAC VIC MTU
CDC 641 Discs &
601 Tapes
Burroughs 2765

FOR SALE

UNIVAC 9300
Honeywell 120
CDC 3300 Memory
CDC 512 Printer
CDC 23141 IBM
plug-compatible
CDC 601 Tape
& Control

Attractive listing, brokerage and Principal transaction services.

GIBBS
Enterprises
Hingham, Mass.
Robert Gibbs
(617) 749-7691

EXECUTIVE OFFICE/COMPUTER SPACE

161 East 42nd Street

- 8,000 square feet, including 1,800 square feet of 18" raised floor area.
- Separate 40-Ton air conditioning system
- Two 400-Amp electrical risers
- Smoke detection and security alarm systems
- Walk in vault
- Many executive offices
- Private bath with shower
- Sublet to April 30, 1977

Galbreath-Ruffin Corporation
150 East 42nd St., New York City MU2-2828

SPECIALISTS IN UNIVAC & HONEYWELL SALE & LEASE

- GE — 225, 235, 415's, 405
- H — 120, 200, 1250, 2200
- IBM — 360/370's
- UNIVAC — 9300, 1108, 1004's, 1005's, DLT's, 70/46

Wanted: Univac, Honeywell, GE Systems & Peripherals

CONTACT:
Gary Johnston, Lee Johnston
or Larry Donat
Free Appraisal

American Computer Exchange
29525 Chagrin Blvd.
Pepper Pike, Ohio 44122
(216) 464-3881

SALE/LEASE

IBM 360/20-8K
2560, 2203
Available Now

Forsythe/McArthur Associates, Inc.
919 N. Michigan Ave.
Chicago, Ill. 60611
(312) 943-3770 TLX 25-5161

ITEL takes the gamble out of buying or selling a used IBM 370

If you're buying, ITEL can provide the exact configuration you want—when you want it. (And we won't just quote you a price. We'll quote you a serial number, too.) If you're selling, we're ready with cash. Either way, call the Computer Sales Corporation at ITEL.

ITEL CORPORATION
One Embarcadero Center San Francisco Calif. 94111 · 415 · 989-4220

FOR SALE

360/65 J with or without core,

7080 compat, 2860 - III,

2870 - I - available Feb. 15, 1974-

now installed at Mutual of New York

Contact: D.R. Tebo

C.I.S. Corp.

Midtown Plaza,
Syracuse, New York 13210,
(315) 474-5776 Telex 93-7435

FOR SALE

NCR Century 100		$ 55,000
NCR Century 200 Octaplex System 64K Memory Cram Unit & Controller		$140,000.00
NCR 407 MICR Sorter		$ 18,000.00
NCR 655-1 Disc Packs		$ 155.00 Each

NATIONAL
DATA PRODUCTS INC.
11910 Bluffton Road
Fort Wayne, Indiana 46809
(219) 747-1502

32K 360/30 CPU FOR SALE

1.5 us
One Selector Channel
Decimal Arithmetic
Floating Point
1051/1052

Immediate Delivery, subject to prior sale or withdrawal
Full IBM maintenance

tbi®
TBI Equipment Div.
Time Brokers, Inc.
500 Executive Blvd.
Elmsford, N.Y. 10523
(914) 592-4065

Nationwide broker/dealers of DP equipment & computer time
Dallas Chicago Encino N.Y. Los Angeles
New York City and Washington D.C.

FOR SALE

IBM SYSTEM 3-MODEL 10 made up of following pieces of equipment:

5410	A14	CPU (15703)
	3971	Printer Attachment
	4101	MFCU Attachment
	6378	2nd Disk Attachment
5203	002	Printer (15572)
5424	A02	MFCU (15663)
5444	A02	Disk (44855)
5496	001	Data Recorder (62645)
1255	001	Magnetic Character Reader (10101)

Seller warrants that all of the equipment set forth has been and is presently under manufacturer's maintenance contract.

Sealed bids should be submitted to:

Bank of Mississippi
P.O. Box 789
Tupelo, Mississippi 38801
Attn: Mrs. Frank Scott

for opening at Noon on Monday, December 31, 1973.

TERMS: Cash before delivery. The seller reserves the right to reject any and all bids.

Equipment available for delivery immediately following confirmation of sale, but not later than January 15, 1974.

Cost of Packing — Insurance and outbound shipping cost to be borne by successful bidder.

Equipment will be delivered at office of Bank of Mississippi, Olive Branch, Mississippi.

For lease
by owner

360/40 G or GF

Floating point. Direct Control. Decimal Arithmetic. Two Selector channels. Storage protect. With or without I/O set and peripherals.

Available Jan. 1974
EDP RESOURCES INC.
One North Broadway
White Plains, N.Y. 10601
(914) 428-3804

For Lease
370/135
360/65
360/50
360/40
360/30
Honeywell 200

Charles Dieges (212) 956-2858
Steve Zaleskie (212) 956-4170

Talcott Computer Leasing
Division of James Talcott, Inc.
1290 Avenue of the Americas
New York, N.Y. 10019.

Member-Computer Lessors Association

BUY SELL SWAP | BUY SELL SWAP | BUY SELL SWAP | BUY SELL SWAP

360/20

8K Card System
16K Disk System
AVAILABLE IMMEDIATELY
CMI Corporation
16225 E. Warren Ave.
Detroit, Michigan 48224
(313) 889-0440
CMI Company
408 Bartlet Building
76 University Ave. W.
Windsor, Ontario N9A 5N7
(519) 258-8910

FOR SALE OR LEASE
IBM 1410
COMPLETE TAPE
AND
DISK SYSTEM
BARGAIN PRICED
D.P. Equipment Marketing Corp.
260 W. Broadway, N.Y. N.Y.
CALL (212) 925-7737 Ext. 1

DISK PACK & CARTRIDGE

Repair Service
and
on-site cleaning and inspection service available NATIONWIDE.
$6.13 each, quarterly

Precision Methods Inc.
Atlantic Research Bldg.
5390 Cherokee Ave.
Alexandria, Virginia 22312
for information call Miss Penny at
(703) 354-5100

360-40 -196K AVAILABLE FOR LEASE

Contact: Don R. Germany
First National Bank & Trust Company of Oklahoma City
P.O. Box 25189
Oklahoma City, Okla. 73125
(405) 272-4062

Time for Sale

CONNECTICUT

COMPUTERISTICS
SUBSIDIARY OF
UNIROYAL
COMPUTER PROCESSING SERVICES
370/158 • 1500 K • OS
HASP RJE
360/50 360/40 360/30
BATCH PROCESS
Call Collect:
Cal Gould (203) 573-3000
George Errico (203) 573-2587

CONTROL DATA CDC 3300 MASTER SYSTEM

Ideal for Educational Institutions — Hospitals — Scientific environments — with Business Data Processing.

CDC Peripherals
Additional Memory

Short term lease or sale on extremely Attractive Terms.
Guaranteed Trade In or Upgrade to IBM 370 System.

Computer Systems of America, Inc.
141 Milk Street, Boston, Mass. 02109
(617) 482-4671

360/65

FOR SALE OR LEASE
AVAILABLE: IMMEDIATELY
901-396-8600
Ext.297

IBM 1130 FOR LEASE OR SALE

Two 1131-2C
Available Immediately
CW Box 4000
797 Washington Street
Newton, Mass. 02160

HONEYWELL-125 COMPLETE SYSTEM

FOR SALE OR SUBLEASE
FOR INFORMATION CONTACT
M.F. LARDNER
(516) 549-6062

PUERTO RICO

IN PUERTO RICO
I.B.M. 360-30
COMPUTER TIME FOR SALE
65K Rel 2G
2 Tapes 800 B P I
3 Discs 2314
2540 with 51 col. Read
1403 1100 L P M
ALSO: COMPLETE LINE OF COMPUTER SERVICES
C.C.C. 765-1550
Midtown Bld. Hato Rey

FOR SALE OR LEASE REASONABLY PRICED

UNIVAC 1108/65K CORE

AVAILABLE WITH OR WITHOUT PERIPHERALS, INCLUDING VIII C TAPE DRIVES, 432 DRUMS, PRINTER, AND NECESSARY CONTROLLERS.

CW Box 3997
797 Washington Street
Newton, Mass. 02160

SALE/LEASE

IBM 360/30-64K
2821, 2540, 1403/N1
Available Now

Forsythe/McArthur Associates, Inc.
919 N. Michigan Ave.
Chicago, Ill. 60611
(312) 943-3770 TLX 25-5161

FOR SALE

IBM 7094

System or Equipments
System Price (Less tapes) is $15,000
call or write
Larry Harris
STAR-TEK INDUSTRIES
4200 Glenarbor, N.W.
Albuquerque, N.M. 87107
(505) 345-6639

MASSACHUSETTS

370/145-256K

6-160/320KB Dual Density
9 Track Tape Drives
6-2314 Disk Drives
2501 Card Reader
1442 Card Reader/Punch
2-1403N1 1100 LPM Printers
3215 Console/Printer
2671 Paper Tape Reader
Grasp 2.5 Multiprogramming Environment Available

Very Low Rates Available On All Shifts and Weekends
CONTACT:
Mr. J. McClow or Mr. J. Green
MAMMOTH MART, INC.
321 Manley Street
W. Bridgewater, Mass. 02379
CALL (617) 583-6800

Randolph... your neighborhood computer leasing company.

With offices in thirteen cities, Randolph backs up their IBM S/360 and IBM S/370 leases promptly with unique customer support services. For details, call Randolph . . . your neighborhood computer leasing company.

Northeast:
537 Steamboat Road
Greenwich, CT 06830
(203) 661-4200
(212) 931-1177
100 Federal St
Boston, MA 02110
(617) 434-4043
621 Country Club Road
Avon, CT 06001
(203) 673-0435
20 Cornell Place
Englishtown, NJ 07726
(201) 446-6300

Mideast:
6110 Executive Blvd.
Rockville, MD 20852
(301) 770-6266

Southeast:
1800 Peachtree Center
230 Peachtree St. NW
Atlanta, GA 30303
(404) 688-6932

Midwest:
8050 Hosbrook Rd.
Cincinnati, OH 45236
(513) 793-6060
625 North Michigan Ave.
Chicago, IL 60611
(312) 787-4224

Southwest:
1545 W. Mockingbird Lane
Dallas, TX 75235
(214) 637-3680
6440 Hillcroft, Suite 108
Houston, TX 77036
(713) 666-9464

West:
One Wilshire Blvd.
Los Angeles, CA 90017
(213) 680-9195
525 University Ave.
Palo Alto, CA 94301
(415) 327-2780
530 "B" Street
San Diego, CA 92101
(714) 232-6401

RANDOLPH COMPUTER COMPANY
Division of Firstbank Financial Corporation
A subsidiary of the First National Bank of Boston

FOR SALE

UNIVAC 9300
32K CPU Multiplexor Channel
Six 9 track tape drives, 800 bpi
132 position printer, 600 lpm
Card reader, 600 cpm
Card punch, 75/200 cpm.

P.O. Box 1599
Boise, Idaho 83701
(208) 345-7770
Attn: Mike Welch

FOR SALE OR LEASE

(2) IBM 1401 4K complete systems
IBM 7080 system with tape drives (729)
IBM 1410 system
(8) IBM 729 mod. 4 tape drives
(6) IBM mod. 6 tape drives
Potter 729(5) and (6) tape drives

Thomas Computer Corp.
600 N. McClurg Court
Suite 3807
Chicago, Ill. 60611
(312) 944-1401

UNIVAC 9200

Will Lease for $255 a Month
24 Month Lease
System consists of:
603-04 Card Punch
711-00 Card Reader
3030-00 Processor
707-08 8K Storage
250-LPM Printer
96 Print Positions
Additional print positions can be added for a nominal rental.
For further information write:
CW Box 3996
797 Washington Street
Newton, Mass. 02160

MICHIGAN

DISC & DRUM

TOTAL REFURBISHMENT

- Replating and Texturing
- New bearings
- Electronic balancing
- R/W head inspection, replacements and adjustments
- Clock writing
- Factory level testing

(213) 889-6031

VALLEY COMPUTER
A Division of TYMSHARE, INC.
31355 W. Agoura Road
Westlake Village, Ca. 91361

ACS
FOR SALE
RARELY-OFFERED
1440-16K
TAPE — DISK
- 7335 II
- 1403 II
- 1412 I

AVAILABLE NOW
ACS Equipment Corporation
8928 Spring Branch Drive
Houston, Tx 77055
(713) 461-1333

FOR SALE

NCR Century 200 System and peripherals including tape drives and controllers, MICR document sorters.

CW Box 4002
797 Washington Street
Newton, Mass. 02160

remote computer processing

- IBM 370 165
- excellent turnaround at extremely attractive rates
- application programs available for use
  NASTRAN and STRUDL
  order entry
  inventory control
  various financial systems
- OS MVT RJE HASP
- DUO for DOS users

Price right? Yes!
Service right? Yes!
Try us!

A.O. Smith
Data Systems Division
Lou Pfeiffer
800 558-8506 Ext 20334

TIME FOR SALE

NEW YORK

Thomas National, Inc.

1775 Broadway, N.Y.C.

370/145

DATACENTER

OS-VS – HASP RJE
Turnkey Responsibilities
DOS Emulation
3330's and 2314's
Systems and Programming Support
Data Entry Services
Convenient Midtown Location
Open 24 Hours Per Day
Call (212) 765-8500

WE ARE
BROKERS
OF
COMPUTER TIME
IN THE NEW YORK AND NEW JERSEY METROPOLITAN AREA.
COMPUTER RESERVES, INC.
(212) 594-7935

I.B.M. - 360-30

All Shifts 65K, 4-2401 MOD-2, 3-2311, 1403-N1, 2540, 1401 Compatibility
From $35.00/Hour
Restaurant Associates Ind.
1540 Broadway bet. 45 & 46th St.
New York, New York 10036
Contact:
Al Palmo at (212) 974-4966
Elliott Musikoff at (212) 974-4967

ILLINOIS

IBM 360/370 USERS
Computer Time Available

370/158 2 meg, 2 3330 (16m), 3 2314 (23m), 10 3420-5 tape, 2 1403, 3211.
OS/VS2, RJE, IMS, TSO, DOS emul.
24 Hours – 7 Days
CAN YOU BEAT
7.2 cent/sec for a 60K region?

370/155 2 meg, 3330 (8m), 2314 (8m), 10 3420-5 tape.

	8am–8pm	8pm–8am
Weekdays	Not Avail	$135/hr.
Weekend	$95/hr.	$85/hr.
12 hr. block weekend	$85/hr.	$75/hr.

370/135 144k, 1 2314, 4 2311, 6 3420-5 Tapes

	8am–8pm	8pm–8am
Weekdays	$85/hr.	$55/hr.
Weekends	$40/hr.	$35/hr.
12 hr. block weekends	$35/hr.	$30/hr.

370/135 240K, 4 3330's, 1 2314, 6 2401-6 Tapes
- Rates same as 370/135 above

360/30 64K, 6 2401 Tapes, 5 2311's

	8am–8pm	8pm–8am
Weekdays	$45/hr.	$35/hr.
Weekends	$25/hr.	$25/hr

FOR FURTHER INFORMATION CALL PAUL SARRIS or RON ELLIS (312) 346-1331

computer research company 200 N. Michigan Av. Chicago, Ill. 60601
Largest Computer Time Sales Company

TIME FOR SALE

ILLINOIS

360/65
OS-MVT-HASP

We will give flat price contracts on jobs regardless of how much running time is involved.

HF/II	APT	MPSX
ICES	BLISS	CROSSTABS
PICS	PAYROLL	SSP
MPS	PLAN	SAS
	BMD	

PROJECT II
ACCOUNTS PAYABLE
ACCOUNTS RECEIVABLE
GENERAL LEDGER
General Purpose Simulation System
Continuous System Modeling Program
Urban Transportation Planning System 360

Block Time and Remote Batch Your Programs or Ours

USE OUR NETWORK OF BATCH TERMINALS AND 4800 BAUD LEASED LINES CONNECTING THE FOLLOWING CITIES:
- *CHICAGO*
- *NEW YORK*
- *CLEVELAND*
- *ST. LOUIS*
- *MILWAUKEE*
- *LOS ANGELES*

Stat:Com
A Division of Statistical Tabulating Corp.
(312) 346-7300
Vern Brownworth

Software for Sale

TAXBREAK

***
Payroll tax calculation module
***
Calculates payroll withholding taxes for 50 states, federal, FICA and cities. COBOL. $875 complete.

Maintenance service on tax changes available for $225 per year.

ARGONAUT INFORMATION SYSTEMS, INC.
Post Office Box 112
WALNUT CREEK, CA.
94596 (415) 937-4675

Paymaster Remedies Payroll Problems

- a comprehensive payroll system
- now serving over 1000 companies
- license for as low as $250 a month
- up to 20 customized deductions and/or allowances . . . all with Y-T-D totals
- handles piecework, including calculations of make-up pay
- accepts input from time cards
- accepts input from terminals
- integrated job costing
- labor distribution
- integrates personnel/payroll records
- completely compatible with IBM 360/370 batch and RJE; Honeywell 200/2000; and Burroughs 1700–4700
- available to companies, institutions and service firms under licensing or purchase

COMTECH
the computer package people
P.O Box 784 Reston, Va., 22070
Telephone (703) 471-7141

SOFTWARE FOR SALE

HOSPITAL
FINANCIAL SYSTEM

- Budget Modeling and Forecasting
- General Ledger
- Productivity Analysis
- Step-down Cost Allocation
- Trend Analysis
- In-Out Patient Costs
- Departmental Analysis
- Hospital Summaries
- Balance Sheet
- Flexible Budgeting
- Financial Reports by Level of Management

Use on your terminal or buy proprietary rights — all in ANSI COBOL.

HSA Hospital
Financial Services, Inc.
120 East Ogden, Hinsdale, Ill. 60521
359 San Miguel
Newport Beach, Calif. 92660
(714) 644-6411

CATS-I/R
INVENTORY RECORDKEEPING

Features include:
*extensive history data
*many user and report options
*good audit trails and mgnt. controls
*designed for efficient processing

Under control of the CATS MASTER Systems Controller, provided FREE with the license of any of the CATS programs. Also available are: Accounts Payable-Cash Requirements, Accounts Receivable – Open Item, and Accounts Receivable – Retail System.

For information contact:
Tom Leopard, President
COMPUTERWARES INTERNATIONAL
P.O. Box 31205, Birmingham
Ala. 35222 - Phone 205/592-6381

AUTOCODER & SPS TRANSLATED AUTOMATICALLY to BAL & PL/1

THE **TOTALTRAN** SYSTEM

. . . The most economical, practical and quickest method of converting to the 3rd and 4th generation.

3 SERVICES OFFERED:
1. 1400 Object to clean source decompilation
2. 1400 Clean source to BAL translation
3. 1400 Clean source to PL/1 translation

Contact: W. Small, President

CPU MANAGEMENT ADVISORY CORP.
853 Broadway, N.Y. 10003
(212) 777-7722

COMPUTERIZED ACCOUNTS RECEIVABLE

Features

1. Automatic Cash
2. Multi-divisional
3. Cash forecasting
4. Deduction notices
5. Unearned discount
6. Dunning
7. Audit trails
8. Customized aging
9. Automatic charge-back
10. Cash tear-sheet
11. Suspense accounts
12. Expanded credit
13. General ledger totals
14. Marginal account reports
15. Credit interchange
16. On-line cash
17. Real-time credit inquiries

Benefits

Eliminate all these headaches:
1. Tub files
2. Late statements
3. One cash card per invoice
4. Extensive clerical effort
5. Unknown credit risks
6. Unclear detailed non-exception reports
7. Unaware credit managers

COMPUTER SYSTEMS & EDUCATION CORP.

David Shefrin
111 Ash Street
E. Hartford, Conn.
06108
(203) 528-9211

Thomas Welsh
840 Hinckley Road
Burlingame, Calif.
94010
(415) 697-3317

CSEC AR/70

SOFTWARE FOR SALE

SYSX

LOOKING FOR SOFTWARE?

Free Software Search and Package Appraisal Service

Our job is to help you locate the software packages which best meet your needs. There is no charge to you for this service. Write on your company letterhead or call:

Systems Exchange Co.
1034 Colorado Ave.
Palo Alto, Calif. 94303
(415) 328-5490

SYSX

ACCOUNTING SYSTEMS

PAYROLL
GENERAL LEDGER
ACCOUNTS PAYABLE
INVENTORY
ACCOUNTS RECEIVABLE

IBM SYSTEM/3 USERS
IBM 360-70 USERS
RPG II BAL COBOL

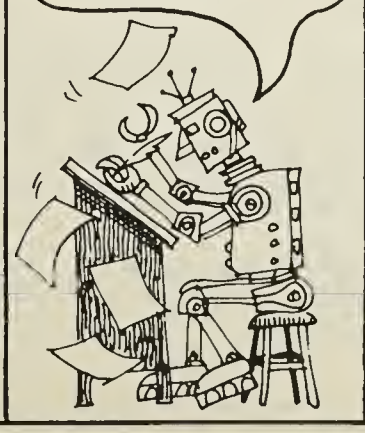
Certified Software Products, Inc.
3050 Metro Drive
Minneapolis, Minn. 55420
(612) 854-3976

ACCOUNTING SYSTEMS

- Accounts Receivable
- Accounts Payable
- General Ledger
- Fixed Asset
- Sales Analysis
- Report Writer

More than 80 companies are successfully and profitably using these valuable management tools. For immediate information, call collect to the office nearest you.

INFONATIONAL
Boston 617/769-5942
Chicago (312) 332-6738
Dallas/Ft. Worth 817/732-6603
Los Angeles 213/383-4191
New York 212/489-1660
San Diego 714/238-1242
1119 Sixth Avenue
San Diego, Ca. 92101



SOFTWARE FOR SALE

now a
- Report Generator
- COBOL Program Generator
- COBOL Programming Tool

SUPER-COBOL
- Complete COBOL Programs from ID card
- Handles up to three files
- 32K required • 30 day trial

70 + USERS—only $960
Call or Write Today
California
Datalease Corporation
6430 Sunset Blvd.
Los Angeles, Calif. 90028
(213) 461-4880

ACCOUNTING IV

THE FINEST GENERAL LEDGER AND FINANCIAL REPORTING SYSTEM AVAILABLE

Featuring:
- Conventional Report Generator
- Graphic Report Generator
- Matrix Report Generator
- Responsibility Reporting
- Flexible Budgeting Module
- Multiple Currency Version to accommodate foreign subsidiary accounting

informatics inc ®
Contact: Ron Kupferman
65 Route 4
River Edge, N.J. 07661
New York (212) 564-1258
New Jersey (201) 488-2100

MSA GENERAL LEDGER

WHY HAVE OVER 500 CLIENTS PURCHASED MSA SYSTEMS?

WHY HAS MSA SOLD OVER 100 GENERAL LEDGER SYSTEMS IN TWO YEARS?

HERE'S WHY!

- EFFICIENT REPORT WRITER
- STATISTICS MANAGEMENT
- FLEXIBLE BUDGETING
- ACCOUNT ANALYSIS
- COST ALLOCATION
- RESPONSIBILITY AND PROFITABILITY REPORTING
- UNLIMITED NUMBER OF REPORTING LEVELS
- PROJECT ACCOUNTING
- DIRECT, FULL ABSORPTION OR INCREMENTAL COSTING
- CURRENCY CONVERSION

USERS BY PRODUCT
PAYROLL/PERSONNEL-215
FIXED ASSETS-140
ACCOUNTS PAYABLE-50
INVENTORY CONTROL-25

Write or Call to Compare
William M. Graves
Management Science America
3445 Peachtree Road, N.E., Suite 1300
Atlanta, Ga. 30326

MSA

Atlanta	404—262-2376
New York	201—871-4700
Chicago	312—323-5940
Los Angeles	213—475-9726
San Francisco	415—328-1700

Bank Loans Achieved

STC Earnings Gain Slightly

LOUISVILLE, Colo – Storage Technology Corp., undeterred by the absence of a tax credit, showed improved earnings in the third quarter.

Earnings rose to $1.2 million or 35 cents a share compared with $1 million or 30 cents a share last year, when there was a $404,000 or 12 cents a share tax credit.

Revenues rose to $15.4 million from $7.6 million in the year-ago period.

As of Oct. 26, the annualized revenues from service and rental income had increased to about $20.7 million from $11 million a year earlier.

In the nine months, the tape and disk drive maker's earnings rose to $4.3 million or $1.25 a share compared with nearly $2 million or 60 cents a share.

Tax credits represented $1.2 million or 33 cents a share in the 1973 period and $845,000 or 34 cents a share in the 1972 period.

The 1972 figures have been restated to reflect a downward adjustment made in audit.

Since the beginning of the third quarter, STC has gained several bank loans, including expanding its credit line to $40 million from $34 million.

An agreement with Lease Financing Corp. provides for the sale of up to $10 million worth of STC tape drives and controllers during a one-year period.

First Pennsylvania Bank agreed in principle to loan STC $3 million on an unsecured term loan basis for five years, in return for which STC will issue warrants for the purchase of 90,000 shares of common.

The firm also sold $7.5 million of 8% convertible subordinate notes to institutional investors. Proceeds were used to reduce bank debt.

UCC Shows Sizable Turnaround

DALLAS – University Computing Co. (UCC) showed a sizable turnaround from last year in pretax earnings from continuing operations in the first nine months, but it wasn't enough to prevent parent company Wyly Corp. from showing a loss during the same period.

Of the Wyly loss of $3.9 million or 47 cents a share, $3.2 million came from a bad debt and $1.3 million from the sale of a portion of UCC in the third quarter.

In the 1972 period, Wyly lost $26.2 million or $3.20 a share, largely from discontinued operations.

Wyly revenues rose to $150.2 million compared with $144.6 million a year ago.

Donald G. Thomson, UCC president, attributed UCC's improved performance to "continued vigorous pressure to control costs, coupled with excellent growth in new business, especially in banking and commercial areas."

The firm signed contracts with 17 banking institutions in the third quarter, he said.

UCC showed pretax earnings from continuing operations in the nine months of $2.7 million compared with a loss of $3.6 million a year ago.

Revenues rose to $61.4 million from $58.6 million.

Among other UCC divisions, the Energy Group and UCC Europe continued to show strong revenue and earnings growth, Thomson said.

MSI Data Corp. Posts Record Revenues

COSTA MESA, Calif. – Second quarter earnings at MSI Data Corp. rose 134% over the year-ago period, for a total of $283,469 or 14 cents a share compared with $121,094 or 7 cents a share in the year-ago period.

Record revenues of $4.9 million compared with $3.2 million in the same period last year.

In the half year, earnings totaled $495,884 or 25 cents a share, compared with $209,610 or 12 cents a share a year ago.

Revenues rose 47% to $9.1 million compared with $6.2 million.

President William Bowers attributed first-half performance partly to the "rapidly proliferating" sales of the firm's portable electronic order entry terminals outside of their traditional market, the supermarket.

Acquisitions

Itel Corp. has acquired D.C.S. Computer Services, Inc.'s accounts receivable package and real estate package as well as the client base for both. The purchase of these packages from D.C.S. is a modification of Itel's previously announced intention to acquire all of the assets of D.C.S.

National CSS, Inc. has agreed in principle to acquire the assets, subject to liabilities, of TBS Computer Centers Corp., for an amount in excess of $4.3 million cash.

Dylakor Computer Systems, Inc. has acquired the Los Angeles Data Center from Optimum Systems, Inc.

Commerce Clearing House, Inc. (CCH) and its majority-owned subsidiary, Computax Services, Inc. (CSI), have terminated plans for a merger of CSI into CCH.

Poughkeepsie Savings Bank has agreed in principle to acquire all outstanding capital stock of the Institutional Data Servicers, Inc. Present plans call for I.D.S., Inc. to operate as a bank subsidiary.

Data Access Systems, Inc. has acquired Ameray Corp. for an undisclosed amount of cash and stock.

Sun Chemical Corp. has agreed to acquire exclusive rights to certain software programs and associated hardware from Mark Computer Systems, Inc. for an undisclosed price, payable in cash upon the closing.

Earnings Reports

BRADFORD COMPUTER & SYSTEMS
Three Months Ended Sept. 30

	1973	1972
Shr Ernd	$.20	$.13
Revenue	11,127,583	8,878,077
aSpec Cred	9,690	7,168
Earnings	770,294	491,434
9 Mo Shr	.58	.41
Revenue	34,823,444	23,253,374
aSpec Cred	29,071	69,311
Earnings	2,249,592	1,416,557

a-In 1973, tax-loss carryforward; in 1972, charge for conversion costs and tax credit.

GENERAL AUTOMATION
Three Months Ended Nov. 3

	1973	1972
Shr Ernd	$.35	$.34
Revenue	12,012,000	5,882,000
Tax Cred	.....	336,000
Earnings	894,000	725,000

KEYDATA
Three Months Ended Oct. 31

	1973	1972
Shr Ernd	$.11	$.06
Revenue	2,872,000	2,149,000
Tax Cred	140,000	83,000
Earnings	303,000	176,000

WALLACE BUSINESS FORMS
Three Months Ended Oct. 31

	1973	1972
Shr Ernd	$.41	$.33
Revenue	11,293,000	9,283,000
Earnings	748,000	590,000

ADDRESSOGRAPH-MULTIGRAPH
Three Months Ended Oct. 31

	1973	1972
Shr Ernd	$.19	$.29
Revenue	123,877,000	106,036,000
Spec Cred	.....	a830,000
Earnings	1,512,000	2,357,000

a-From sale of a surplus credit.

TALLY
Three Months Ended Sept. 30

	1973	1972
Revenue	$3,428,957	$3,137,107
Loss	a393,707	233,671
9 Mo Rev	9,356,302	9,338,305
Spec Chg	b111,261	.....
Loss	1,009,471	663,813

a-Includes a provision of $500,000 for costs associated with the uncertainty of the future marketability of certain products. b-From dispostion of a division.

NATIONAL SYSTEMS
Nine Months Ended Sept. 30

	1973	1972
Revenue	$11,301,000	$13,249,000
Disc Op	.....	(209,000)
Spec Chg	.....	a3,171,000
Loss	122,000	3,349,000

a-Reflects change in accounting principles.

DATA DOCUMENTS
Year Ended Sept. 30

	1973	1972
Shr Ernd	$2.96	$2.02
Revenue	37,891,306	28,952,350
Tax Cred	53,000	45,000
Earnings	1,390,783	949,867

DATA GENERAL
Year Ended Sept. 29

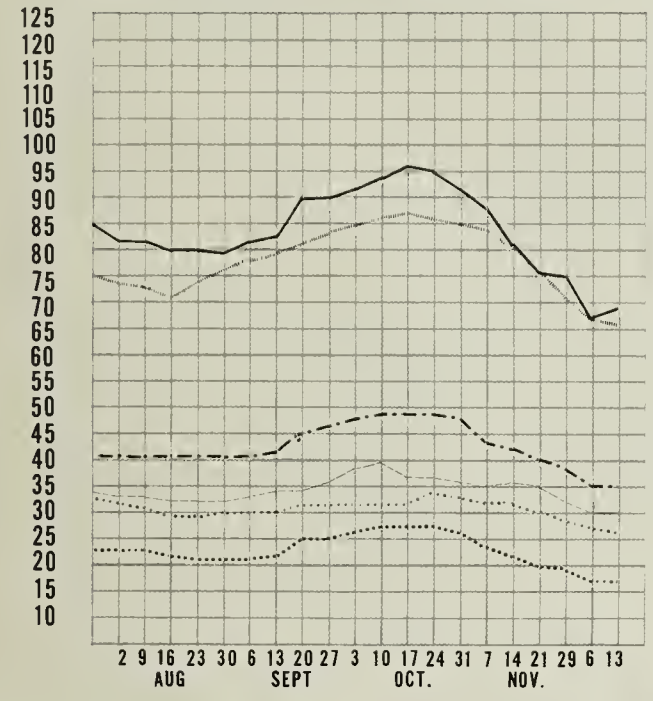
	1973	1972
Shr Ernd	$.83	a$.49
Revenue	53,306,000	30,324,000
Earnings	6,741,000	3,897,000

a-Adjusted for a three-for-one stock split in March 1973.

COMTEN
Nine Monthes Ended Sept. 30

	1973	1972
Shr Ernd	$.10	.....
Revenue	6,005,100	$4,225,000
Tax Cred	99,900	.....
Earnings	208,200	(217,700)

COMPUTERWORLD Computer Stocks Trading Indexes



TRADE*QUOTES

Computerworld Stock Trading Summary

All statistics compiled, computed and formatted by TRADE★QUOTES, INC. Cambridge, Mass. 02139

EXCH		1973 RANGE (1)	CLOSE DEC 12 1973	WEEK NET CHNGE	WEEK PCT CHNGE
	COMPUTER SYSTEMS				
N	BURROUGHS CORP	205-252	204 3/4	-11 7/8	-5.4
N	COLLINS RADIO	16- 26	24 3/4	0	0.0
O	COMPUTER AUTOMATION	5- 20	8 7/8	- 5/8	-6.5
N	CONTROL DATA CORP	31- 62	32 3/8	- 5/8	-1.8
O	DATA GENERAL CORP	28- 49	31 1/2	+3 1/2	+12.5
O	DATAPOINT CORP	10- 21	12 1/2	+1 1/4	+11.1
O	DIGITAL COMP CONTROL	2- 6	2 5/8	+ 3/8	+16.6
N	DIGITAL EQUIPMENT	73-117	86 3/4	+2 3/4	+3.2
N	ELECTRONIC ASSOC.	2- 9	2 7/8	+ 1/4	+9.5
A	ELECTRONIC ENGINEER.	6- 14	8 5/8	+ 3/8	+4.5
N	FOXBORO	23- 48	40 7/8	+2 1/8	+5.4
O	GENERAL AUTOMATION	22- 55	29 1/2	+2 3/4	+10.2
O	GRI COMPUTER CORP	1- 3	3/4	- 1/8	-14.2
N	HEWLETT-PACKARD CO	73- 99	76 7/8	- 5/8	-0.8
N	HONEYWELL INC	72-139	72 1/8	-1 7/8	-2.5
N	IBM	249-340	250 5/8	-2 5/8	-1.0
O	INTERDATA INC	7- 14	8 1/4	- 7/8	-9.5
O	MICRODATA CORP	2- 10	3 1/8	+ 7/8	+38.8
N	NCR	27- 46	31 1/2	- 1/4	-0.7
N	RAYTHEON CO	22- 35	27 1/2	+2 1/4	+8.9
N	SINGER CO	36- 74	37 1/8	- 5/8	-1.6
N	SPERRY RAND	36- 56	42 3/8	-1 1/8	-2.5
A	SYSTEMS ENG. LABS	2- 8	1 1/2	- 1/8	-7.6
N	TEXAS INSTRUMENTS	83-138	100	+ 3/8	+0.3
O	ULTIMACC SYSTEMS INC	1- 11	1 1/2	- 1/8	-7.6
N	VARIAN ASSOCIATES	10- 20	10 5/8	+ 3/4	+7.5
N	WANG LABS.	13- 34	17	- 3/4	-4.2
N	XEROX CORP	122-169	123 5/8	+1 1/4	+1.0
	LEASING COMPANIES				
A	BOOTHE COMPUTER	1- 5	1 1/8	0	0.0
O	BRESNAHAN COMP.	1- 2	2	0	0.0
O	COMDISCO INC	4- 17	4 5/8	+ 3/8	+8.8
O	COMMERCE GROUP CORP	3- 4	3 1/8	+ 1/8	+4.1
O	COMPUTER EXCHANGE	1- 1	3/8	0	0.0
A	COMPUTER INVSTRS GRP	2- 8	2	- 7/8	-30.4
O	COMR. INSTALLATIONS	1- 2	1	0	0.0
M	DATRONIC RENTAL	2- 3	1 1/2	- 1/8	-7.6
A	DCL INC	0- 3	3/8	-	-12.4
A	DEARBORN-STORM	12- 26	14 3/4	+ 3/4	+5.3
N	DPF INC	3- 9	2 3/4	+ 1/8	+4.7
O	EDP RESOURCES	1- 3	3 1/8	+ 3/8	+13.6
A	GRANITE MGT	2- 6	2 3/4	- 1/4	-8.3
A	GREYHOUND COMPUTER	3- 6	3 1/8	0	0.0
A	ITEL	4- 12	3 7/8	0	0.0
N	LEASCO CORP	8- 18	10 3/8	- 1/4	-2.3
O	LEASPAC CORP	1- 8	1 1/8	0	0.0
O	LECTRO MGT INC	1- 2	1/4	0	0.0
O	NRG INC	3- 15	3 3/8	- 1/8	-3.5
A	PIONEER TEX CORP	4- 8	4	- 1/2	-11.1
A	ROCKWOOD COMPUTER	1- 3	3/4	0	0.0
N	U.S. LEASING	16- 36	16 1/4	- 1/4	-1.5

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

EXCH		1973 RANGE (1)	CLOSE DEC 12 1973	WEEK NET CHNGE	WEEK PCT CHNGE
	SOFTWARE & EDP SERVICES				
O	ADVANCED COMP TECH	1- 2	1 3/8	- 1/8	-8.3
A	APPLIED DATA RES.	2- 4	1 7/8	+ 1/8	+7.1
O	APPLIED LOGIC	1- 3	1/4	0	0.0
N	AUTOMATIC DATA PROC	39- 94	54	+4	+8.0
O	BRANDON APPLIED SYST	1- 1	1/2	0	0.0
O	CENTRAL DATA SYSTEMS	3- 9	3 1/4	+ 1/4	+8.3
O	COMPUTER DIMENSIONS	2- 5	2	- 1/4	-11.1
O	COMPUTER DYNAMICS	1- 2	1/2	0	0.0
O	COMPUTER HORIZONS	1- 6	2	- 1/4	-11.1
O	COMPUTER NETWORK	1- 5	1 1/8	0	0.0
N	COMPUTER SCIENCES	2- 6	2 1/8	- 1/4	-10.5
O	COMPUTER TASK GROUP	1- 2	3/4	0	0.0
O	COMPUTER TECHNOLOGY	1- 3	1/2	0	0.0
O	COMPUTER USAGE	3- 9	3 3/4	+ 1/2	+15.3
O	COMRESS	1- 2	1/4	0	0.0
O	COMSHARE	2- 9	2 3/8	0	0.0
N	CORDURA CORP	3- 15	3	- 1/4	-7.6
O	DATATAB	1- 4	1	0	0.0
A	ELECT COMP PROG	1- 2	3/4	+ 1/8	+20.0
N	ELECTRONIC DATA SYS.	24- 56	24 1/2	+ 3/4	+3.1
O	INFONATIONAL INC	1- 2	1/2	- 1/8	-20.0
O	INFORMATICS	2- 6	5 1/4	0	0.0
O	I.O.A. DATA CORP	1- 1	3/8	0	0.0
O	IPS COMPUTER MARKET.	1- 5	1	0	0.0
O	KEANE ASSOCIATES	3- 5	2 1/2	0	0.0
O	KEYDATA CORP	5- 12	4 3/4	- 3/4	-13.6
O	LOGICON	2- 7	2 3/8	- 1/8	-5.0
A	MANAGEMENT DATA	1- 5	1 3/8	+ 1/8	+10.0
O	NATIONAL CSS INC	18- 42	25 1/2	+1 1/2	+6.2
O	NATIONAL COMPUTER CO	1- 1	3/8	0	0.0
O	NATIONAL INFO SRVCS	1- 2	3/8	0	0.0
P	ON LINE SYSTEMS INC	12- 25	24	+2 3/4	+12.9
N	PLANNING RESEARCH	2- 7	2 1/8	0	0.0
O	PROGRAMMING METHODS	17- 25	17	0	0.0
O	PROGRAMMING & SYS	1- 1	1/2	0	0.0
O	RAPIDATA INC	3- 24	3 1/4	- 1/2	-13.3
O	SCIENTIFIC COMPUTERS	1- 3	5/8	0	0.0
O	SIMPLICITY COMPUTER	1- 4	1 5/8	- 1/4	-13.3
O	TRS COMPUTER CENTERS	2- 7	5 1/4	+1 1/4	+31.2
O	TCC INC	1- 1	1/8	0	0.0
O	TYMSHARE INC	6- 13	8 1/2	+ 1/2	+6.2
O	UNITED DATA CENTER	3- 6	3	0	0.0
A	URS SYSTEMS	3- 8	2 5/8	- 1/8	-4.5
N	WYLY CORP	3- 11	3	0	0.0
	PERIPHERALS & SUBSYSTEMS				
N	ADDRESSOGRAPH-MULT	9- 34	9 3/8	-1	-9.6
O	ADVANCED MEMORY SYS	4- 23	4 1/4	+ 1/4	+6.2
N	AMPEX CORP	3- 7	3 3/8	- 1/4	-6.8
O	ANDERSON JACOBSON	2- 6	2	+ 1/4	+14.2
O	BEEHIVE MEDICAL ELEC	5- 10	5	+ 1/2	+11.1
A	BOLT,BERANEK & NEW	6- 12	7 1/4	+ 5/8	+9.4
N	BUNKER-RAMO	6- 18	6 3/8	-1 1/8	-15.0
A	CALCOMP	5- 16	8	+ 1/8	+1.5
O	CAMBRIDGE MEMORIES	8- 17	13 1/2	- 1/4	-1.8
O	CENTRONICS DATA COMP	13- 38	16 1/4	- 3/4	-4.4
O	CODEX CORP	9- 19	9	+ 1/2	+5.8
O	COGNITRONICS	1- 3	1/2	0	0.0

EXCH		1973 RANGE (1)	CLOSE DEC 12 1973	WEEK NET CHNGE	WEEK PCT CHNGE
O	COMPUTER COMMUN.	1- 4	3/8	+ 1/8	+50.0
A	COMPUTER EQUIPMENT	2- 3	1 5/8	0	0.0
O	COMPUTER MACHINERY	4- 13	4 1/4	+ 3/4	+21.4
O	COMPUTER TRANSCEIVER	1- 6	3/4	- 1/8	-14.2
N	CONRAC CORP	13- 32	13 3/8	- 3/8	-2.7
O	DATA ACCESS SYSTEMS	1- 3	1 1/4	0	0.0
O	DATA 100	9- 19	9 5/8	- 1/2	-4.9
A	DATA PRODUCTS CORP	2- 5	3	0	0.0
A	DATA RECOGNITION	2- 3	1 1/2	0	0.0
O	DATA TECHNOLOGY	1- 5	1 1/2	0	0.0
O	DECISION DATA COMPUT	6- 40	5 3/4	- 1/4	-4.1
O	DELTA DATA SYSTEMS	1- 1	3/8	- 1/8	-25.0
O	DIVAN CONTROLS	1- 4	7/8	- 5/8	-41.6
N	ELECTRONIC M & M	3- 6	3 1/8	0	0.0
O	FABRI-TEK	2- 5	2 1/8	0	0.0
O	GENERAL COMPUTER SYS	3- 9	3 1/2	+ 3/4	+27.2
N	GENERAL ELECTRIC	56- 76	59	- 5/8	-1.0
N	HAZELTINE CORP	4- 9	4 3/8	- 1/8	-2.7
O	INFOREX INC	3- 23	4 1/4	+1 1/8	+36.0
O	INFORMATION DISPLAYS	1- 2	1/4	+ 1/8	+100.0
O	INFORMATION INTL INC	8- 15	8 3/4	+ 1/4	+2.9
A	LUNDY ELECTRONICS	3- 9	2 7/8	0	0.0
O	MANAGEMENT ASSIST	1- 1	1/4	0	0.0
N	MEMOREX	2- 19	1 1/2	0	0.0
A	MILGO ELECTRONICS	14- 28	14 1/4	-1 3/8	-8.7
N	MOHAWK DATA SCI	3- 13	2 7/8	+ 1/8	+4.5
O	ODEC COMPUTER SYST.	2- 6	2 1/8	0	0.0
O	OPTICAL SCANNING	2- 8	2 1/4	0	0.0
O	PERTEC CORP	4- 8	4 1/4	+ 1/2	+13.3
O	PHOTON	3- 7	3 3/4	0	0.0
A	POTTER INSTRUMENT	3- 9	3	0	0.0
O	PRECISION INST.	2- 6	1 3/4	- 1/4	-12.5
O	QUANTOR CORP	5- 10	5 3/4	+1	+21.0
O	RECOGNITION EQUIP	2- 8	2 3/8	- 3/8	-13.6
N	SANDERS ASSOCIATES	6- 18	7	+ 7/8	+14.2
O	SCAN DATA	1- 6	2 1/8	+ 1/8	+6.2
O	STORAGE TECHNOLOGY	11- 34	11 1/2	-1 3/8	-10.6
O	SYCOR INC	9- 20	10	- 3/4	-6.9
O	TALLY CORP.	2- 14	1 3/4	+ 1/8	+7.6
O	TEC INC	6- 9	5 3/4	0	0.0
N	TEKTRONIX INC	30- 55	40 3/4	+1 1/4	+3.1
N	TELEX	3- 8	3	0	0.0
O	WANGCO INC	7- 13	8 1/4	+ 7/8	+11.8
O	WILTEK INC	7- 18	7 1/4	+ 1/4	+3.5
	SUPPLIES & ACCESSORIES				
O	BALTIMORE BUS FORMS	5- 9	5 3/4	0	0.0
A	BARRY WRIGHT	5- 13	5 1/4	+ 1/8	+2.4
O	CYBERMATICS INC	1- 3	1 1/8	- 1/8	-10.0
A	DATA DOCUMENTS	17- 26	20 3/8	+ 3/8	+1.8
O	DUPLEX PRODUCTS INC	7- 10	6 3/4	- 5/8	-8.4
N	ENNIS BUS. FORMS	5- 8	4 5/8	- 1/8	-2.6
O	GRAHAM MAGNETICS	8- 20	7 3/4	0	0.0
O	GRAPHIC CONTROLS	7- 12	7 3/4	+ 3/8	+5.0
N	3M COMPANY	76- 91	75 5/8	0	0.0
O	MOORE CORP LTD	53- 65	55 1/4	+1 1/2	+2.7
N	NASHUA CORP	36- 58	36 3/4	+ 5/8	+1.7
O	REYNOLDS & REYNOLD	27- 51	26 1/2	-3	-10.1
O	STANDARD REGISTER	12- 20	12	+ 3/8	+3.2
O	TAB PRODUCTS CO	8- 23	8	- 1/2	-5.8
N	UARCO	15- 23	15	+ 1/4	+1.6
A	WABASH MAGNETICS	5- 8	5 1/4	+ 1/8	+2.4
N	WALLACE BUS FORMS	15- 26	16 1/8	0	0.0

THREE MORE IRRESISTIBLE REASONS NOT TO KEEP YOUR IBM 1130.

We've already covered three reasons you ought to replace your IBM 1130 with our 18/30 DMS.

You get a lot more throughput. You don't have the hassle of rewriting your software. And it saves you money.

Now we give you three more reasons. Three new real time software telecommunications systems that run on the 18/30 DMS. And they're still DM2 compatible.

You can buy the basic 18/30 DMS now and upgrade when you want to. You don't pay for real time until you're ready to use real time.

If your needs are simple, our Real Time Communications Monitor System, with front end communications multiplexer, will do the job.

In case you need more power, we have two Real Time Data Processing Systems, one with time sharing capability (Dartmouth BASIC). Both systems have General Automation's SPC-16 as a front end processor; it's the most powerful minicomputer available. Both have a powerful file management package and accessibility from as many as 32 remote terminals.

No matter which system you start out with, you get capability for greatly expanded core memory and floating point hardware.

It all boils down to this. If you want more throughput ability, our 18/30 DMS can save you money. If what you're looking for is multi-programming and real time, we can save you a fortune.

And headaches too.

For all the details, write General Automation, 1055 South East Street, Anaheim, California 92805. Or call us at (714) 778-4800.

European headquarters: Centre Silic, Cidex L242, 94533 Rungis, Paris, France. Phone 686-7431.

GENERAL AUTOMATION 18/30 DMS